JPRS 77203

19 January 1981

Japan Report

No. 115

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO.
JPRS 77203

2.

3. Recipient's Accession No.

4. Title and Subtitle
JAPAN REPORT, No. 115

5. Report Date
19 January 1981

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Joint Publications Research Service
1000 North Glebe Road
Arlington, Virginia 22201

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
As above

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This serial report contains press and radio coverage on political, sociological, economic, military, and scientific and technological developments.

17. Document Analysis a. Descriptors

JAPAN
Political
Sociological
Military
Economic
Science and Technology

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group 5C, 5D, 5K, 15C, 16D, 18I, 19F, 22B

18. Availability Statement:
Unlimited Availability
Sold by NTIS
Springfield, Virginia 22161

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page)
UNCLASSIFIED

21. No. of Pages
146

22. Price

(See ANSI-Z39.18)

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

JPRS 77203

19 January 1981

JAPAN REPORT

No. 115

CONTENTS

POLITICAL AND SOCIOLOGICAL

Japanese Census Shows Small Growth Rate
(KYODO, 19 Dec 80) 1

Briefs

NTT Post 2

MILITARY

ASDF To Start F-4 ASIP FY 1981
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80) 4

JDA To Order Five XF-3 Engines From IHI in March
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80) 6

Experts Support to Tan-SAM Introduction
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80) 7

All-Module Maintenance of Adour To Start in FY '81
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80) 10

MSDF Requests Drone Launchers for UP-2J's
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80) 11

MSDF Hopes To Procure Four Destroyers in FY '81
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80) 12

Briefs

ASDF To Test T-1 13
CH-47-414 To Replace V-107 13

ECONOMIC

Bridgestone To Promote Aircraft Tire Exports to U.S.
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80) 14

[III - ASIA - 111]

Toyo To Export Bearing Through Fafnir
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)........................ 15

KHI Likely To Be Named MT-X Prime Contractor
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)........................ 16

MELCO To Expand Defense System Division
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)........................ 17

Toshiba, KHI/NEC Complete Prototype Portable SAM's
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)........................ 18

Industry Urges Government To Ease Arms Export Ban
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)........................ 19

SJAC To Participate in 1981 Paris Air Show
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)........................ 20

CTDC Commissions Five Firms To Study Four 767 Components
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)........................ 21

KHI's Missile Sales To Reach ¥5,000 Million in FY '82
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)........................ 22

IHI To Test T56, F100 Parts for License Production
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)........................ 23

Airbus Proposing Japan Join SA Program as Equal Partner
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)........................ 24

BCAC Official in Tokyo for Talks on Y-XX
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80)........................ 26

Briefs

UAE Switchboard Order 27
Libyan Steel Mill Contract 27
PRC Margarine Plant 27
Singapore Computer Center 28
ASEAN Fertilizer Contract 28
Aid to Honduras 28
Aid to The Gambia 28
Air Agreement With Finland 28
Aid to Haiti 28
Aid to Philippines 29
Yen Loan to Indonesia 29
Refugee Aid for Thailand 29
Aid to Sierra Leone 29
Argentine Steel Project Investment 29
Shiseido Toiletries in PRC 30
Bank of China Agreement 30

SCIENCE AND TECHNOLOGY

Industrial Technology Developments Detailed
(KOGYO GIJUTSU, Jun 80).. 31

- Aircraft Industry
- Space Industry
- Atomic Energy Apparatus Industry
- Electronic Computer Industry
- Information Processing Industry
- Optical Industry
- Engineering Industry
- Robot Industry
- Supplementary Funds, by Koshin Kura
- Development Plans

Tests of APR-4 Warning System Start on C-1 Transport
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)...................... 134

TR&DI To Test 120mm Gun for New MBT in Late November
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)................ 135

MITI Inaugurates Study Group on Space Industry
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)...................... 136

NASDA Drafts H-1 Rocket Specifications
(JPE AVIATION REPORT-WEEKLY, 3 Dec 80)...................... 137

Government To Import H-1 Rocket Parts From U.S.
(JPE AVIATION REPORT-WEEKLY, 10 Dec 80)..................... 139

JDA To Fabricate Advanced Rotor System in Five Years
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80)..................... 140

Adoption of Gun for MBT Depends on Test Results
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80)...................... 141

JDA To Procure Softer-Recoil Gun Components in FY '80
(JPE AVIATION REPORT-WEEKLY, 17 Dec 80)..................... 142

Briefs
- Development of Sound Locator 143
- Jet Engine for New SSM 143

POLITICAL AND SOCIOLOGICAL

JAPANESE CENSUS SHOWS SMALL GROWTH RATE

OW190211 Tokyo KYODO in English 0150 GMT 19 Dec 80

[Text] Tokyo Dec 19 KYODO--The total population of Japan as of October 1 stood at 117,057,485, an increase of only 4.6 percent (5,120,000) from five years ago.

This was reported to the regular cabinet meeting Friday by Director General Taro Nakayama of the prime minister's office on the basis of the national census taken in October.

He said the rate of increase of the nation's population when compared with 1975 when the previous census was taken was the lowest in postwar years.

The low increase rate was attributed to the continuing decline in the birth rate since 1973.

Of the population, males accounted for 57,593,074 and females, 59,464,411, indicating a ratio of 96.9 males per 100 females.

The number of households totaled 35,976,517, an increase of 6.6 percent from 1975.

The average number of household members stood at 3.25, virtually unchanged from the 3.32 in 1975.

By prefecture, the population in Tokyo declined 0.5 percent from five years ago for the first time after the war to total 11,615,069 but it still ranked top among the 47 prefectures.

It was followed by Osaka (8,470,000), Kanagawa (6,920,000), Aichi (6,220,000) and Hokkaido (5,580,000).

Tottori, facing the Sea of Japan in western Honshu, had the smallest population of 604,225. It was followed by Shimane (780,000), Fukui (790,000) and Yamanashi (800,000).

If a comparison is made with other countries, Japan dropped to seventh place from the sixth spot in respect to population after China, India, the Soviet Union, the U.S., Indonesia and Brazil.

The population density stood at 314 persons per square kilometer, ranking Japan fifth after Belgium, or unchanged from five years ago.

In the census taken in 1965, when movements of the population to major cities were conspicuous, most of the prefectures in the Tohoku, Hokuriku and Chugoku areas on Honshu Island and in Shikoku and Kyushu were hit by a drop in population.

The latest census showed, however, that the population increased in all of the prefectures, excluding Tokyo, with little gaps in the rate of increase.

But the rate of increase in prefectures located near big cities still was high.

It ranged between 8 and 14 percent in Chiba, Saitama, Ibaraki and Kanagawa prefectures, all located near Tokyo, and Nara and Shiga, located close to Osaka and Kyoto.

The census also showed that the sprawling phenomenon in areas surrounding Tokyo, Osaka and Nagoya has become further conspicuous.

Among the large cities, the population of Yokohama increased to 2,773,822, ranking it second next to the 8,350,000 of the 23 ward areas in Tokyo. It thus replaced Osaka (2,650,000) in the No. 2 spot.

The cities of Kumamoto and Kagoshima in Kyushu also saw their population increase to the 500,000 level.

Of the cities, towns and villages in the country, only 1,511, or less than half of the total, recorded a population drop.

This indicated the tendency seen in recent years of people moving to large cities returning to their native places.

CSO: 4120

POLITICAL AND SOCIOLOGICAL

BRIEFS

NTT POST--Tokyo Dec 19 KYODO--Nobuhiko Ushiba, former minister for External Economic Affairs, has turned down repeated requests that he take over the post of president of the Nippon Telegraph and Telephone Public Corporation (NTT), officials said Friday. They said Ushiba met with Chief Cabinet Secretary Kiichi Miyazawa Thursday night and informed him that he will not be able to accept the post. As a result, the meeting scheduled between Ushiba and Miyazawa Friday morning when the chief cabinet secretary was expected to formally ask Ushiba to become NTT president has been canceled. Posts and Telecommunications Minister Ichiro Yamanouchi met with Ushiba Thursday afternoon and asked Ushiba to assume the top post in the NTT. But Ushiba, who served in the past as vice foreign minister and ambassador to the U.S., told Yamanouchi that he would not accept the post due to health reasons and inexperience in management of public corporations. Prime Minister Zenko Suzuki, in a meeting with Yamanouchi Thursday morning, suggested that Ushiba was the most suitable person to succeed Tokuji Akikusa who has tendered his resignation to take responsibility for accounting irregularities involving the corporation. [Text] [OW190151 Tokyo KYODO in English 0212 GMT 19 Dec 80]

CSO: 4120

MILITARY

ASDF TO START F-4 ASIP IN FY 1981

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 5-6

[Text] The Air Self-Defense Force (ASDF) has proposed ¥769 million for an aircraft structural integration program (ASIP) to lengthen F-4EJs' life and ¥2,074 million for their modernization in a budgetary request for FY 1981.

Under the ASIP, flight recorders will be placed on all of F-4EJ fighters to collect airframe data, which will serve as the basis for maintenance and repair. This program is designed to lengthen the F-4EJ's life from the current 3,000 hours to 5,000 to 6,000 hours so that planned retirement of one F-4EJ squadron in FY 1987 could be extended. The ASDF is hopeful of lengthening the F-4EJ's life as the US Air Force has successfully extended the F-4's life to 5,200 hours.

The ASDF intends to procure computers and other equipment and establish a specific program in FY 1981, receive equipment in FY 1982 and collect data in FY 1983. Necessary maintenance and repair work is planned to start in FY 1985.

Under the modernization program, performance of F-4EJs will be improved so that they can serve as support aircraft for F-15J fighters. Fire control systems (FCS) will be replaced by advanced types used on the F-16 and F-18, while look-down functions will be reinforced. New AIM-7F Sparrow and AIM-9L Sidewinder missiles will be utilized. To improve electronics warfare capability, they will be quipped with modern ECM, ESM and IFF systems.

Furtheremore, combat flaps and leading edge slats will be mounted to upgrade their combat capability. Since the Israeli Air Force has successfully improved F-4s for air superiority missions, the ASDF expects that modernized F-4EJs will be able to counter Soviet fighters.

A master modernization schedule envisages designing of electronics equipment and airframe modification in FY 1981, receipt of equipment and modification components in FY 1982, testing and modifying airframes in FY 1983, and conducting practical tests for equipment in FY 1984. Full-scale modernization will start in FY 1987. But the ASDF has still to decide whether to modernize all of its F-4EJs.

Meanwhile, the modernization program does not include the accurate bombing black boxes of the 5010BH attitude control systems and refueling systems, which were removed from F-4EJs at the time of their procurement.

CSO: 4120

MILITARY

JDA TO ORDER FIVE XF-3 ENGINES FROM IHI IN MARCH

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 2

[Text]

The JDA will place a ¥4,566 million order with Ishikawajima-Harima Heavy Industries Co. (IHI) for five prototype XF-3 small turbofan engines in March 1981 under the FY 1980 budget, following delivery of the XF-3-1 test engine in FY 1975 and the XF-3-20 in FY 1977. IHI has already submitted an estimate for fabrication of the five prototypes.

The XF-3 is a promising candidate to power the MT-X next-generation intermediate jet trainer, planned to be developed from FY 1981.

The Technical R&D Institute (TR&DI) of the JDA plans to procure five additional XF-3 prototypes in FY 1981. A total of ¥2,550 million for that purpose is incorporated into the JDA budget request.

The 10 prototypes will be used for preflight rating tests involving high-altitude performance, safety, reliability and durability from late FY 1981 to the middle of FY 1983. If fabrication and tests go well, the XF-3 engine research and fabrication program will finish at the end of the tests.

CSO: 4120

EXPERTS SUPPORT TO TAN-SAM INTRODUCTION

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 pp 4-6

[Text] Civilian experts have drafted a report supporting selection of the Tan-SAM short-range surface-to-air missile and recommended the JDA introduce the domestically developed missile as early as possible.

They were asked to consider the Tan-SAM after Keigo Ouchi of the Democratic Socialist Party questioned the performance of the missile in the Diet in October.

Minister for Defense Joji Omura presented the report to the National Defense Council last week, asking for government approval of the Tan-SAM procurement program starting in FY 1981.

The JDA has requested about ¥25,800 million for FY 1981 to procure 10 Tan-SAMs for the GSDF and ASDF.

Encouraged by the report, it will seek funds at budget negotiations with the Ministry of Finance (MOF) until last December, However, the MOF, giving priority to financial reconstruction, is expected to reject all new defense procurement items, including the Tan-SAM. The MOF's budget draft is likely to omit funds for the Tan-SAM. But it is uncertain how the Tan-SAM funding problem will be settled eventually.

Details of the experts' report on the Tan-SAM follow:

1. Necessity of Short-Range SAMs

Short-range SAMs are an important part of Japan's comprehensive air defense system comprising various anti-aircraft weapons. In this context, Japan should procure short-range SAMs meeting its own mission requirements as early as possible.

2. Comparison of the Tan-SAM with Other Missiles

Foreign missiles, including the Roland and Rapier, have unique characteristics meeting requirements of the users. Although they have some improved capabilities over the Tan-SAM, it best meets Japan's requirements. Specifically, the Tan-SAM is more inferior in bad weather. But most other capabilities of the Tan-SAM are superior. The Tan-SAM also has sufficient technical growth potential, allowing for successive improvement to meet changes as they occur.

3. Capabilities

The Tan-SAM's inferiority in bad weather is not a problem during actual missions. Although the Tan-SAM leaves smoke trails that can be detected by intruding aircraft, the enemy aircraft cannot avoid the missile because of its limited turning ability during a short-range flight as well as the missile's excellent homing performance. There is little possibility of a Tan-SAM hitting friendly aircraft by mistake because its identification capability is superior to other missiles due to a detection range two times as great.

Although the Tan-SAM's higher price tag than the Roland has been pointed out, the gap between their lowest prices is not significant. If life cycle cost is considered, the Tan-SAM is less than the Roland.

The Tan-SAM is less vulnerable than foreign missiles to radio jamming. Furthermore, infrared ray countermeasures will be difficult to take against the Tan-SAM.

The Roland is more mobile than the Tan-SAM. But this is not a problem with requirements in Japan. The Tan-SAM has better all-direction performance than other missiles.

The Tan-SAM will contribute more than imported missiles to Japan's military technical development. It also has a higher growth potential since improvement of foreign missiles usually involves difficulties.

4. Recommendations on procurement

In order to acquire military equipment meeting Japan's defense requirements, we should study, develop and produce weapons on our own. Self-developed weapons can be improved to cope with changes in threats and technical upgrading. This will also lead to development of Japan's defense production setup and technology, and encourage engineers. Development and production of the Tan-SAM using Japan's electronics technology will pave the way for further technical advancement as well as development of other new missiles.

Advanced military technology could become a bargaining power in Japan's negotiations with foreign countries for introduction of foreign technology.

As recent rapid development in science and technology affects military technology, the "make and improve" principle should be adopted for weapons systems. In this respect, an active radar homing system and other new systems will have to be developed for the Tan-SAM to improve its all-weather capability and other performance aspects.

CSO: 4120

MILITARY

ALL-MODULE MAINTENANCE OF ADOUR TO START IN FY '81

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 6

[Text] The ASDF is expected to introduce an all-module maintenance method for TF-40 Adour engines for T-2 supersonic trainers and F-1 support fighters.

So far, the ASDF has shipped engines to manufacturers' plants for overhaul. Under the new method, however, modulewise checks will be carried out so that some modules can be exchanged with new ones at airbases. New modules will be on hand at airbases and only modules requiring repair will be taken to outside plants.

The Adour engine will be divided into 13 modules, of which seven must be exchanged with new ones every 400 hours. Six other modules will be exchanged according to results of checks.

CSO: 4120

MILITARY

MSDF REQUESTS DRONE LAUNCHERS FOR UP-2J'S

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 7

[Text] The MSDF has asked the JDA Central Procurement Office to procure BQM-34A high-speed target drone air launchers for the UP-2J firing training support aircraft as planned in the FY 1980 budget.

The UP-2J, a modified version of the P-2J antisubmarine patrol aircraft, will replace the S-2F-1U multipurpose aircraft as a firing training support aircraft. Two UP-2Js will become operational in FY 1983.

The UP-2J will be equipped with a missile detector simulator, a jamming system and a sleeve-type target drone tower as well as target launchers.

The first UP-2J was equipped with the missile detector simulator in FY 1979. The target tower of the S-2F-1U will be mounted from FY 1980 to 1981 and target launchers from FY 1981 to 1982.

In FY 1979, the second UP-2J was equipped with the target tower and the jamming system was procured for use from FY 1980 to 1981. The target launchers, to be procured in FY 1981, will be used from FY 1982 to 1983.

The MSDF also plans to modify two more P-2Js for obtaining electronic warfare data. The modified P-2J, named EP-2J, will carry the electronic warfare data collecting system. The system for the first EP-2J was procured in FY 1979 for use from FY 1980 to 1981. That for the second EP-2J is incorporated into the FY 1981 budget request with installation planned for FY 1982-83.

CSO: 4120

MSDF HOPES TO PROCURE FOUR DESTROYERS IN FY '81

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 pp 7-8

[Text] The MSDF hopes to have its request for four destroyers for FY 1981 approved along with the FY 1981 fleet rehabilitation and modernization (FRAM) program involving two destroyers.

The four vessels costing about ¥164,500 million include a 4,500-ton DDG and three 2,900-ton DDs. The FRAM program is estimated at ¥19,300 million. These are part of the MSDF's FY 1981 shipbuilding plan totaling ¥264,400 million.

The FY 1980-84 Medium Term Defense Program (MTDP) envisages procurement of two DDG, 10 DD and four DE type destroyers--two DDs and one DE in FY 1980, the four in FY 1981, three DDs and one DE in FY 1982, one DDG and one DE in FY 1983, and two DDs and one DE in FY 1984. They are designed to replace 15 destroyers and 11 subchasers being decommissioned over the FY 1978-81 period. The four destroyers, if approved, will greatly contribute to maintenance of the current antisubmarine fleet strength.

The 4,500-ton DDG as a future mainstay of the escort fleet will perform better than a 3,900-ton DDG procured in FY 1978. A COGAG (combined gasturbine and gasturbine configuration) powerplant will be adopted instead of a steam turbine for the 3,900-ton DDG. It will be armed with Harpoon surface-to-surface missiles in canisters and the CIWS A helicopter deck will also be mounted.

As for DDs, the MSDF started a program in FY 1977 for establishing a 20-ship fleet rapidly. Procurement of 20 DDs is expected to end by FY 1985.

CSO: 4120

MILITARY

BRIEFS

ASDF TO TEST T-1--The Air Self-Defense Force (ASDF) plans to conduct fatigue tests of the T-1 medium trainer in FY 1982 to discover how long its life can be extended prior to replacement by the MT-X next-generation medium trainer now under study. The MT-X is designed to replace the T-33 as well as the T-1. The new trainers will first succeed T-33s, which are expected to be rapidly phased out from 1987. After T-33s are replaced by MT-X's, replacement will shift to T-1s. Intermediate training with T-1s was started by the 13th ASDF Air Training Wing at Ashiya Airbase in 1960. At present, there are more than 50 T-1s. Since they are now 20 years old, new types are required to increase training efficiency. The 20-year old trainers have been exposed to salt corrosion at the coastal airbase. Although careful maintenance has been carried out to prevent corrosion, some items, including the air intake, have been weakened with partial repair required. The coming tests will study how current maintenance measures can prolong the T-1's life. As for performance, the T-1 takes 20 minutes to fly to training space from the airbase, decreasing training time to 30 minutes. The ASDF wants training time to be one hour or more. Therefore, a greater speed and longer range will be major requirements for the MT-X. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 7,8]

CH-47-414 TO REPLACE V-107--The Ground Self-Defense Force (GSDF) is expected to select the CH-47-414 as the CH-X to replace the V-107 transport helicopter. This is because the US Army has established arrangements for long-term procurement and maintenance of the CH-47 series. The GSDF's final selection is seen likely before acquisition of two CH-X helicopters for training in FY 1983 or 1984. The FY 1980-84 Medium-Term Defense program envisages procurement of the two training-purpose CH-X's. After taking delivery of the two helicopters, the GSDF plans to procure 45 to 60 CH-X helicopters over seven or eight years with V-107s being phased out from FY 1984 or 1985. The new helicopters will be used for transport of improved Hawk missiles, TOW anti-tank missiles, new long-range 155mm howitzers and other GSDF weapons. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 p 8]

CSO: 4120

BRIDGESTONE TO PROMOTE AIRCRAFT TIRE EXPORTS TO U.S.

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 p 1

[Text] Bridgestone Tire Co. will launch full-scale export of aircraft tires to the United States soon as its tires have passed evaluation tests of major American airlines.

It hopes to capture a 30 percent share in the US aircraft tire market with demand for new tires reaching 30,000 per year.

The company started export of aircraft tires to the European market in 1972. Its present European customers include Lufthansa, British Airways, SAS, SABENA, KLM and other major carriers. Its tires are used for large transports such as DC-9s, DC-10s, Boeing 727s, 737s, 747s, and L-1011 TriStars.

Bridgestone obtained a 15 percent share in the European aircraft tire market in 1979. Annual demand totals 25,000.

In 1978, the firm began to deliver aircraft tires to US carriers for evaluation tests covering economic efficiency as well as qualitative aspects. This year, its tires passed tests by United Air Lines, Eastern, Frontier Airlines, and Texas International Airlines, paving the way for full-fledged exports to the United States. Pan American World Airways' tests are still underway.

Bridgestone has FAA-certified testing facilities at its Tokyo Works to ensure its aircraft tires meet American carriers' requirements.

While promoting aircraft tire exports to the United States, it intends to facilitate cooperation with retreading firms.

CSO: 4120

TOYO TO EXPORT BEARING THROUGH FAFNIR

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 1-2

[Text] Toyo Bearing Mfg. Co. has agreed with Fafnir Bearing Co., a division of Textron Inc., to extend their technical tie-up contract to sales, enabling its bearings for aircraft to be marketed in Europe and the United States through Fafnir's sales networks.

Toyo introduced aircraft bearing manufacture technology from Fafnir in November 1970. At present, it holds a 60 percent share in the Japanese aircraft bearing market.

The extension of their technical tie-up to sales is in anticipation that the European and US aircraft bearing markets will expand.

CSO: 4120

KHI LIKELY TO BE NAMED MT-X PRIME CONTRACTOR

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 p 2

[Text] The Japanese Defense Agency (JDA) is expected to select Kawasaki Heavy Industries (KHI) as prime contractor for development of the MT-X medium jet trainer starting in FY 1982 (April 1982-March 1983), according to industry sources. The selection will come after the JDA's request for funds for design of the MT-X airframe in FY 1981 is approved by the Diet.

Besides KHI, Mitsubishi Heavy Industries (MHI) and Fuji Heavy Industries (FHI) have expressed willingness to be MT-X's prime contractor.

The JDA's move to nominate KHI for the MT-X program has reportedly derived from fear that KHI's aircraft technology would decline in the absence of JDA aircraft orders. Although JDA selected KHI as prime contractor for development of a PX-L antisubmarine patrol aircraft and an airborne early warning system, programs for their domestic development have been dropped. Furthermore, the JDA has suspended orders for KHI's C-1 transports.

Problems are still expected before final selection because MHI and FHI are certain to promote their campaigns.

CSO: 4120

MELCO TO EXPAND DEFENSE SYSTEM DIVISION

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 2-3

[Text] Mitsubishi Electric Corp. (MELCO) intends to set up an extensive planning and systems technology group at its new defense systems project office to expand its business in these fields.

The extensive planning group will prepare MELCO's defense systems projects and determine project schedule, while the systems technology group will direct systemization of defense equipment at MELCO's plants and handle requests from the JDA and other customers. About 20 engineers at the defense systems, computer and communications equipment works will be assigned to the two groups. The defense systems project office will also be enlarged.

MELCO's sales to the JDA in FY 1979 totaled ¥53,000 million, indicating a strong foothold in production of electronic and electric defense equipment. Of equipment delivered to JDA during the year, missiles accounted for 40 percent and fire control systems (FCS) 30 percent. The remainder included electronics warfare equipment, radar systems, communications equipment and data processors. Sales to JDA in FY 1980 are expected to increase 10 percent over FY 1979.

MELCO's establishment of the defense systems project office has been prompted by JDA's policy toward modernization and systemization of defense equipment. JDA is expected to follow this policy while reviewing the FY 1980-84 Medium Term Defense Program in FY 1981.

CSO: 4120

ECONOMIC

TOSHIBA, KHI/NEC COMPLETE PROTOTYPE PORTABLE SAM'S

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 3-4

[Text] Toshiba Corp. and the KHI - Nippon Electric Co. (NEC) group have completed first prototypes of portable surface-to-air missiles (SAM). They will be delivered to the JDA's Technical R&D Institute (TR&DI) at the end of November for evaluation tests. Evaluation results are expected to be known by next February or March.

The TR&DI started research and development of the portable SAM in FY 1979 with completion of development planned for FY 1984. The shoulder-launched missile is designed for air defense of airbases and radar sites.

In FY 1979, the three companies submitted plans to the TR&DI, and Toshiba and the KHI-NEC group were selected to fabricate homing heads and other parts.

The KHI-NEC group has adopted the image homing guidance system to hold down prices, while Toshiba has selected a mixture of image homing and infrared ray homing formulas with priority given to accuracy.

Although the TR&DI originally intended to select one of the two for development, both types are now expected to be adopted for development in consideration of the two contractors' equally competitive technology.

A conspicuous feature of both types is the image homing guidance formula, which Japan has never developed. Under the formula, an image sensor on the head of the missile, like a television camera, detects and tracks a target. The device consisting of 5mm X 5mm CCD elements is as small as the palm of the hand.

The three missile manufacturers claim they have developed the image sensor on their own, although there were foreign advanced guidance systems to copy.

The JDA plans to import foreign portable SAMs with different guidance systems in FY 1981. From 1985, however, it intends to procure domestically developed portable SAMs.

CSO: 4120

INDUSTRY URGES GOVERNMENT TO EASE ARMS EXPORT BAN

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 4-5

[Text] The Electronics Industries Association of Japan (EIAJ) will urge the Japanese government to lift its export ban on arms to countries other than those involved in conflicts, a spokesman for EIAJ said last week. Presently the government bans export of all Japanese made military equipment.

The statement is considered to be the industry's answer to a Democratic Socialist Party member of the House of Representatives who has claimed that a Japanese developed short-range surface-to-air missile coded here as the Tan-SAM costs more than the Roland missile adopted by France and Germany as well as the United States.

High costs of the Japanese developed weapons are mainly attributable to the fact that they are developed and produced for the Japanese Self-Defense Forces only, and that the quantity of each item required by the SDF is limited, he said. The government should allow the industry to export Japanese military equipment so that it can compete with foreign products on an equal basis, and this competition would help reduce the prices of Japanese made arms, he added.

The industry should, nevertheless, abide by the Export Control Law which forbids sales of arms to communist countries, and those to which export of arms is prohibited by resolutions of the United Nations, as well as to those involved or liable to be involved in conflict, the association maintains. In February 1976, then Prime Minister Takeo Miki practically banned export of all military equipment to any country.

EIAJ is expected to officially sound out the government and Liberal Democratic Party after consulting with top leaders of the Defense Production Committee of the Federation of Economic Organizations, Japan Ordnance Industry Association and the Society of Japanese Shipbuilders.

EIAJ does not believe the government will easily lift the arms export ban, but plans to create a general atmosphere where matters related to development and production of military equipment can be debated more openly, industry sources say.

CSO: 4120

SJAC TO PARTICIPATE IN 1981 PARIS AIR SHOW

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 p 3

[Text] The Society of Japanese Aerospace Companies (SJAC) has decided to join in the 34th Paris Air Show June 4-14 next year, calling on member companies to exhibit products at the air show.

It will start full-scale preparations for participation with shipment of exhibits planned for the end of next March. SJAC Chairman Eiichi Ohara will also attend.

SJAC's purpose is to expand the Japanese aerospace industry's trade with foreign countries in view of the importance of international aerospace cooperation. It wants to publicize Japanese industry and promote international interchange and exchange of information.

It will give priority to company-by-company exhibits as well as overall exhibits to expand sales, introduce Japanese industry ability, and step up foreign appreciation of Japanese products.

At the show, SJAC plans to use 20 to 23 indoor booths for exhibits and a 72-square-meter single chalet for entertainment.

SJAC's conceivable exhibits include vendors' products, RJ500, FJR and other aeroengines, products of airframe manufacturers, and introduction of the space industry and airlines.

CSO: 4120

ECONOMIC

CTDC COMMISSIONS FIVE FIRMS TO STUDY FOUR 767 COMPONENTS

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 3-4

[Text] The Civil Transport Development Corp. (CTDC) has concluded contracts worth ¥60 million with five companies for development and testing of four components of the Boeing 767 in FY 1980.

The five firms are Yokohama Rubber Co., Hokushin Electric Works Ltd., Tokyo Koku Keiki Co., IHI, and Sumitomo Precision Products Co.

Development and tests of the four components have been conducted since FY 1979. The four components and their past development and test results follow:

(1) Honeycomb sandwich structure items (Yokohama Rubber): An appropriate fiber combination was chosen for developing the preplug designed to set at 250 degrees Fahrenheit. The preplug was fabricated for evaluation tests.

(2) Inertial navigation system (Hokushin Electric, Tokyo Koku Keiki): A navigational computing component for a strapdown inertial navigation system was designed, while a device using a microcomputer was fabricated. Evaluation and environmental tests were conducted on angular velocity and acceleration sensors with improved accuracy and stability.

(3) Aircraft integrated data system (AIDS) (IHI): Measures were studied to demonstrate engine data analysis technology vital to the engine AIDS system.

(4) Ultrahigh tension steel landing gear (Sumitomo Precision): Computers were used for analyzing a rough runway taxiing load and shock absorbers' performance, which have a major relation to landing gear design. Material tests involved 300M steel.

CSO: 4120

ECONOMIC

KHI'S MISSILE SALES TO REACH ¥5,000 MILLION IN FY '82

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 4-5

[Text] Sales of Kawasaki Heavy Industries Ltd. (KHI) missile division are expected to increase from the current ¥3,000 million yearly to ¥5,000 million in FY 1982 due to mass production of the Model 79 antiship/tank missile, codenamed "Ju-MAT" by KHI, as well as JDA orders for research related to portable surface-to-air missiles (SAM).

Although KHI developed the Model 64 antitank missile in 1964 as Japan's first domestically developed missile, its missile division sales have been less than Mitsubishi Electric Corp. and other firms manufacturing missiles under license.

Together with increasing Ju-MAT production, however, development of various new missiles planned by JDA could sharply expand KHI's missile business in the decade starting in 1985.

On the portable SAM, KHI has formed a group with Nippon Electric Co. (NEC) in order to win the JDA development contract.

KHI has also been named prime contractor for development of a medium-range antitank missile using a laser homing guidance system.

One problem in missile development projects is which company(s) KHI should select as its partner(s) undertaking electronics systems.

Although KHI has so far formed a group mainly with NEC for missile projects, including the Ju-MAT, it has participated in Tan-SAM short-range missile development as a subcontractor of Toshiba Corp. which is the prime contractor. KHI says its cooperation with Toshiba will increase in the future.

KHI has so far developed and produced mainly antitank missiles, monopolizing domestic production of such missiles. With the portable SAM project, however, it wants to extend its missile field to SAMs.

CSO: 4120

ECONOMIC

IHI TO TEST T56, F100 PARTS FOR LICENSE PRODUCTION

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 5-6

[Text] Ishikawajima-Harima Heavy Industries (IHI) will start the first tests of engine parts for the P-3C aircraft and the F-15 fighter in early 1981 to obtain license production certification.

Tests of about 200 parts of the T56 for the P-3C will begin in January, while tests covering about 200 parts of the F100 for the F-15 will start in February or March.

The Japanese Defense Agency (JDA) ordered 12 T56 engines in FY 1978. Of them, 10 engines will be equipped with IHI-produced parts. The first will be delivered from December 1981. IHI will produce 790 components, including those for the coming tests, of the 1,042 in each engine.

The JDA's F-15 order in FY 1978 involved 32 F100 engines, of which two have already been acquired by IHI. The remaining 30 engines are eight for knockdown production and 22 for partial license production. Of the 1,418 items per engine, IHI's license production will cover 1,052, including those for the coming tests. Delivery of the first F100 with IHI-produced items will start in October 1981.

More F100 parts were subjected to IHI's license production at Japan-US governmental negotiations last summer, in which the Japanese side requested an increased domestic production share for the F-15. Certification tests of the additional components will be conducted as quickly as possible.

Of the 12 ordered T56 engines, four will be delivered in December 1981, two in January 1982, two in February and four in March.

Two F100 engines for testing were delivered at the end of FY 1979. Eight engines for knockdown production will be delivered between April and June 1981. Delivery of the remaining 22 will be from October 1981 to August 1982.

CSO: 4120

ECONOMIC

AIRBUS PROPOSING JAPAN JOIN SA PROGRAM AS EQUAL PARTNER

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 6-7

[Text]

Bernard Lathiere, President of Airbus Industrie, told a press conference in Tokyo last Wednesday that the European consortium is proposing that the Japanese aircraft industry join its Single-Aisle (SA) Aircraft Program as an euqal partner.

After explaining details of the present status of his organization and prospects of current and future aircraft programs, such as development versions of the A300 which Toa Domestic Airlines will begin using very soon and its smaller brother, the A310, he went on to say that Airbus Industrie plans to begin development of the SA series narrow-body twin-engine aircraft in about one year, and that it is scheduled to enter airline service toward the end of 1985 or early 1986.

Lathiere said that the consortium is proposing Japan join the SA program from the early design stage to development, production and marketing on an equal basis. Airbus Industrie is seeking Japan's cooperation not as a mere subcontractor but as a full partner, he emphasized. "We would like to continue this partnership into our next generation," he said.

The SA series aircraft which Airbus Industrie is proposing for joint development will be a brand new airliner incorporating new technology. It will be designed to replace such present narrow-body aircraft and its derivatives as the Boeing 727-200, 737-300, and various types of the McDonnell Douglas DC9 including the Super 80.

The SA, which will take advantage of the experience gained on the A300 and A310, will have commonality in many areas with both aircraft, using the latest advances in terms of aerodynamics and structure (use of composite materials), digital systems and cockpit instruments. It will offer high performance standards particularly for operation out of short, hot-and-high airfields, low fuel consumption, low noise, high standards of passenger comfort and good cargo capability, and of course lower operating costs than competitive aircraft, Latiere stated.

Lathiere also told the press that the cooperation between Japanese manufacturers and Airbus Industrie in the new aircraft program will certainly help improve the trade relations between Japan and the EC countries.

Asked about the organizational setup for promotion of the SA program with Japan, Lathiere replied that establishment of a new policy board may be considered for the program, but that the present efficient management setup should continue to be maintained. Further discussions will, however, be made on this matter, he added.

Concerning the marketing of the SA aircraft, Airbus Industrie is not considering division of sales territory by participating companies. "A single sales organization is the best as this has been proven with the sales of the present A300 and the A310," Lathiere said.

CSO: 4120

ECONOMIC

BCAC OFFICIAL IN TOKYO FOR TALKS ON Y-XX

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 pp 1-2

[Text] T. J. Backer, Director - International Business, Boeing Commercial Airplane Co. (BCAC), was in Tokyo recently for talks with top executives of the Japanese aircraft industry on issues related to development of new medium-size aircraft coded here as the Y-XX program.

As a member of BCAC's special committee conducting feasibility studies on new aircraft, Backer reportedly exchanged opinions with Japanese industry leaders as part of Boeing's efforts to expand its business relations with the Japanese aerospace industry which is already committed to the 767 program.

Although recent talks helped promote mutual understanding between the two parties, the American company, busy on the 757 program and studies on the 737-300 project, was very cautious on the Japanese Y-XX program, according to local industry sources.

On the other side, the Japanese industry has to make up its mind about its basic stance toward the Y-XX soon in order to have preliminary survey funds approved in the cabinet draft of the FY 1981 national budget request which is scheduled to be finalized toward the end of December.

CSO: 4120

BRIEFS

UAE SWITCHBOARD ORDER--Tokyo 16 Dec KYODO--Fujitsu, Ltd. said Tuesday it has received a yen 600 million order for 100 systems of electronic private branch exchanges (EPBX) known as "Fetex 400" from United Arab Emirates' Emirates Telecommunications Corp. (EMIRTEL). Fujitsu said that the UAE has decided to introduce the systems as part of its policy to accelerate its domestic economy. It underbid the world's 13 makers, including Siemens A.G. of West Germany, Ericsson Telephone Co. of Sweden and Plessy Co. of Britain in an international bidding held last May. The deal was negotiated through Toyo Menka Kaisha, Ltd. (Tomen), Japan's seventh largest general trading house. [Text] [OW190133 Tokyo KYODO in English 0539 GMT 16 Dec 80]

LIBYAN STEEL MILL CONTRACT--Tokyo 18 Dec KYODO--Libya has awarded Japanese firms cash-on-delivery contracts for construction of steel mills in Misurata, east of Tripoli, capping years of marathon negotiations, sources said Thursday. A Japanese-Mexican consortium, led by Kawasaki Heavy Industries Ltd., has landed a yen 90 billion (about dollar 430 million) contract to build two 550,000-ton-a-year direct-reduction iron mills, after underbidding the Korf group of West Germany and other companies. The contract is expected to be signed in Tripoli shortly. The mills, based on technology developed by Mexico's Hylsa, will be powered by locally abundant natural gas. They are designed to serve as the core of the Misurata Integrated Steel Complex. The Libyan Government-owned corporation for iron and steel projects has also selected the group of Kobe Steel Ltd. and Mitsui and Co. as the successful bidder for construction of steel bar, wire rod and shape mills and water treatment and other related facilities for the steel complex. This contract is valued at yen 160 billion (dollar 760 million). The bar and wire rod mill will have an annual capacity of 400,000 tons and another mill will be capable of producing 120,000 tons of shapes and beams annually. The Mammoth Steel Complex, with an annual capacity of 1.26 million tons, is estimated to cost the equivalent of yen 700 billion (dollar 3.3 billion). [OW190133 Tokyo KYODO in English 0553 GMT 18 Dec 80]

PRC MARGARINE PLANT--Tokyo 17 Dec KYODO--Sakura Seisakusho Ltd. of Osaka disclosed Wednesday it had signed a contract to build China's first integrated margarine and shortening plant. The contract with the Beijing branch of the China National Machinery Import and Export Corporation calls for the plant to be completed by next May. The Japanese company will also provide margarine and shortening production know-how to the Beijing Food Industry Research Institute. Value of the deal was not disclosed. [Text] [OW190133 Tokyo KYODO in English 0302 GMT 17 Dec 80]

SINGAPORE COMPUTER CENTER--Singapore 18 Dec KYODO--Japan Thursday signed a document with Singapore to establish a joint computer center to train Singaporeans in software technology. Japan will supply 3 million Singapore dollars (yen 300 million) worth of computers and send 6 experts to the center and also train 20 Singapore students in Japan. [Text] [OW190133 Tokyo KYODO in English 1245 GMT 18 Dec 80]

ASEAN FERTILIZER CONTRACT--Tokyo 16 Dec KYODO--Toyo Engineering Corp. said Tuesday that it had signed a yen 70 billion contract to supply a major fertilizer plant to P.T. ASEAN Aceh Fertilizer, a fertilizer firm jointly owned by five members of the Association of Southeast Asian Nations (ASEAN) countries. The plant is the first project involving the ASEAN, grouping Indonesia, the Philippines, Thailand, Malaysia and Singapore, to head for materialization. The plant with a daily production capacity of 1,000 tons of ammonia and 1,725 tons of urea is expected to be completed in the first quarter of 1984 at Lhokseumawe, in Aceh. The projected fertilizer plant in Indonesia will be financed by the two Japanese governmental financial institutions, Overseas Economic Cooperation Fund and the Export-Import Bank of Japan. [OW190133 Tokyo KYODO in English 0755 GMT 16 Dec 80]

AID TO HONDURAS--Tokyo 17 Dec KYODO--Japan will extend grant aid of up to yen 300 million to Honduras for a project to increase production of corn and beans under notes exchanged in Teguciagalpa Tuesday between Japanese ambassador Kenji Ishikawa and Cesar Elvia Sierra, foreign minister of Honduras, the foreign minister said Wednesday. It said extension of the grant aid was requested by the Honduras Government to secure agricultural machinery necessary for implementation of the project. [Text] [OW190133 Tokyo KYODO in English 0203 GMT 17 Dec 80]

AID TO THE GAMBIA--Tokyo 20 Dec KYODO--Japan will provide the Gambia with a grant totaling yen 210 million to buy American wheat, the foreign ministry said Saturday. Notes to this effect were exchanged Friday in Banjul by Japanese ambassador to the Gambia Sonoo Uchida and Lamin Kiti Jabang, external affairs minister of the Gambia, officials said. The West African state is predominantly agricultural, producing groundnuts as the major source of its foreign exchange revenue. But, production has declined, due to the repeated droughts, the officials said. [Text] [OW230013 Tokyo KYODO in English 0520 GMT 20 Dec 80]

AIR AGREEMENT WITH FINLAND--Tokyo, 24 Dec KYODO--Japan and Finland agreed to establish direct air service between the two countries, the foreign ministry announced Wednesday. The agreement was signed in Helsinki Wednesday between Japanese Ambassador Koichiro Yamaguchi and Matti Tuovinen, secretary general of Finnish Ministry of Foreign Affairs. The flow of passengers and goods between the two countries has increased recently as bilateral trade and other economic relations expanded. Finnair plans to operate one flight weekly from next April, but Japan Air Lines has no plan to commence the service in the near future. [Text] [OW241039 Tokyo KYODO in English 0827 GMT 24 Dec 80]

AID TO HAITI--Tokyo, KYODO--Japan will provide Haiti with up to yen 300 million in aid for its increased food production. Notes to this effect were exchanged Wednesday (Japan time) in Port-au-Prince between Tokuya Shinmura, Japanese charge d'affaires ad interim, and Georges Salomon, minister for foreign affairs and worship of the Caribbean country. The sum will be used for a five-year program to increase food production. [Text] [OW241039 Tokyo KYODO in English 0906 GMT 24 Dec 80]

AID TO PHILIPPINES--Tokyo, 24 Dec KYODO--Japan and the Philippines exchanged notes Wednesday on yen 2,000 million (about dollar 9.5 million) grant aid designed to increase the later's food production, the foreign ministry said. A ministry spokesman said the notes were exchanged in Manila between Japanese Ambassador Hideo Tanaka ana Philippine Foreign Minister Carlos Romulo. The grant will be used to purchase fertilizer, agricultural chemicals and machinery, the spokesman added. [Text] [OW241039 Tokyo KYODO in English 0924 GMT 24 Dec 80]

YEN LOAN TO INDONESIA--Tokyo 23 Dec KYODO--Japan will provide Indonesia with a yen 58 billion loan during the current fiscal year ending in March 1981 under an agreement concluded in Jakarta Tuesday, the government announced. The loan, repayable over a period of 30 years, including a 10-year grace period, at an annual interest of 2.5 percent, will be used for hydro power plant construction, port and harbor repair and other development projects. The government said the agreement also called for disbursement of yen 28.2 billion loans to Indonesia left over from earlier agreements due to delays in development which were to be covered by such loans. [Text] [OW230501 Tokyo KYODO in English 0424 GMT 23 Dec 80]

REFUGEE AID FOR THAILAND--Tokyo, 23 Dec, KYODO--Japan will donate yen 300 million to Thailand for various relief activities for Kampuchean refugees, the foreign ministry said Tuesday. The ministry said the Japanese Government has decided on the aid in response to the Thai request. This brings to yen 3,200 million the total amount of money Japan extended to Thailand in the current fiscal year in support of the country's refugee relief program, according to the ministry. [Text] [OW230501 Tokyo KYODO in English 0649 GMT 23 Dec 80]

AID TO SIERRA LEONE--Tokyo 23 Dec KYODO--Japan will extend to Sierra Leone food aid up to yen 200 million in rice and a grant aid up to yen 300 million, the foreign ministry said Tuesday. Notes on the aid were exchanged in Freetown Monday by Japanese Charges d'Affaires Hiroshi Funakoshi and Sierra Leone Foreign Affairs Minister Abdulai Conteh. The yen 300 million grant aid will cover the cost of transporting the rice to the African country, the foreign ministry said. In fiscal 1979, which ended last March, Japan extended to Sierra Leone a food aid in rice valued at dollar 1,020,000 including dollar 22,000 in transportation costs. [Text] [OW230501 Tokyo KYODO in English 0309 GMT 23 Dec 80]

ARGENTINE STEEL PROJECT INVESTMENT--Buenos Aires, 24 Dec, KYODO--Japan has formally told Argentina that its government and private businesses are ready to invest jointly in the Argentine project to expand its state-run steelworks, the Japanese Embassy here said Wednesday. Contents of the notification were not disclosed. According to informed sources, however, the Japanese Government will pay 20 percent of dollar 50 billion asked to be invested in the new equipment and expansion work at the steelworks--Sociedad Mixta Siderurgia Argentina (SOMISA). Argentina called for the Japanese cooperation with the project when its president, Jorge Rafael Videla visited Japan in October last year. The Latin American country at first asked Japan to invest a total of dollar 200 billion in the project. But the amount was later reduced to dollar 50 million. Argentina is expected also to ask West Germany for financial support for the project. [Text] [OW261453 Tokyo KYODO in English 0100 GMT 25 Dec 80]

SHISEIDO TOILETRIES IN PRC--Tokyo, 26 Dec, KYODO--Shiseido Company, Japan's top maker of cosmetics, announced Friday it would begin to sell its toiletries in China next February. The company said it recently signed an agreement on the marketing of its products in China with the Beijing branch of the China National Light Industrial Products Imports and Export Corporation. It said it was the second foreign concern to penetrate the Chinese cosmetic market after Max Factor of the United States. China asked the company to sell its toiletries at hotels in Beijing and other cities, it added. Under present plans, Shiseido will initially sell about 50 products in China, it added. [Text] [OW261453 Tokyo KYODO in English 1025 GMT 26 Dec 80]

BANK OF CHINA AGREEMENT--Tokyo, 16 Dec (JIJI PRESS)--Bank of Tokyo Tuesday announced it has concluded a business cooperation agreement with the Advisory and Trust Department of Bank of China, the sole foreign exchange bank in that country. The accord calls for, among others, introduction of business customers. The department will arrange for compensation (production sharing) trade, processing trade and joint ventures by introducing funds from abroad--business that has so far been undertaken by China International Trust and Investment Corp. Under the agreement, the two banks will also exchange information on those fields of business and cooperate in surveys and fund raising. [Text] [OW170257 Tokyo KYODO in English 1355 GMT 16 Dec 80]

CSO: 4120

INDUSTRIAL TECHNOLOGY DEVELOPMENTS DETAILED

Aircraft Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6, Jun 80 pp 20-27

[Article by the Aeronautical Weapons Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Significance and Special Features of the Aircraft Industry

After the war, Japan's economy accomplished an advanced growth unparalleled in the world and many industries were developed in the process with some of them achieving world standards. The automobile, steel, shipbuilding and electrical industries are some of the representative ones.

As for the aircraft industry, its standards in pre-war days were world ranking, but production was banned after the war for 7 years during which period the world trend in the industry was on jet conversion, and as a result of her late resumption in production, Japan lagged far behind the U.S., Great Britain, France, etc., and this gap situation has remained unchanged today.

The chief causes of this situation are as follows:

First, the aircraft industry is a technology-intensive industry that requires the most advanced in technological sophistication, but the fact is that, because of the technological innovation brought about by jet conversion, the technological difference between Japan and the Western countries was almost insurmountable. Second, although progress of the aircraft industry and the development of aircraft are supportive of each other, the development of one type of aircraft requires a vast outlay of capital and because it meant competing against big business of the Western nations for the world market, the business risk was heavy and therefore it was not easy to consider undertaking aircraft development. Third. the defense budget on aircraft was very small when compared with that of the Western nations and because the development projects on the Defense Agency's aircraft were few in number, much could not be expected as technological spinoffs from the Defense Agency aircraft. Fourth, the aircraft industry is a composite industry only after the various phases and facets that include materials and components are integrated, but in Japan the ancillary industries were too weak.

However, the aircraft industry is a representative knowledge-intensive industry that has a high rate of additional value and a far-reaching technological effect. This fact is borne from the following comparisons: the value of the unit weight (per ton) of the transport aircraft is 80 million yen while that of the aircraft engine is 140 million yen; others are electronic computer, 30 million yen; color TV, 5 million yen and automobile, 900 thousand yen. (Figure 1)

Key:
- (1) Value per unit weight (1 million yen/ton)
- (2) Aircraft engine
- (3) Transport aircraft
- (4) Camera
- (5) Electronic computer
- (6) Color TV
- (7) Automobile
- (8) Shipbuilding
- (9) Compiled by the Civil Transport

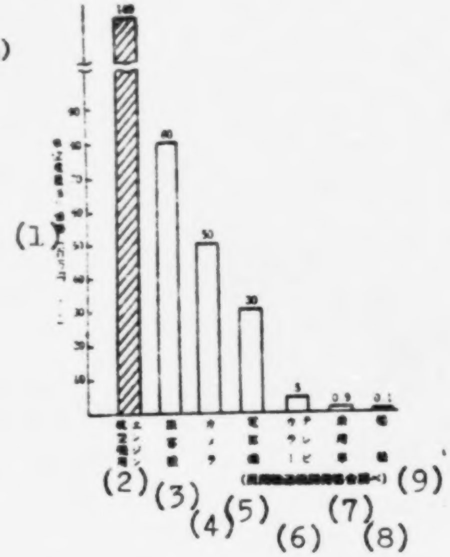


Figure 1. Comparion of Values Per Unit Weight (1975)

Even the rate of additional value is very high: transport aircraft, 44 percent; aircraft engine, 48 percent; electrical equipment, 37 percent; iron and steel, 28 percent and automobile, 24 percent. (Figure 2)

Key:
- (1) Net value rate (%)
- (2) Aircraft engine
- (3) Aircraft
- (4) Machiner
- (5) Shipbuilding
- (6) Electrical
- (7) Iron and steel
- (8) Automobile

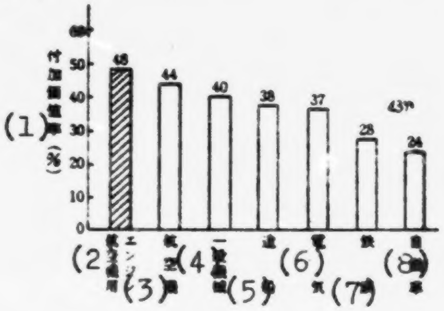


Figure 2. Comparison of Addition Rates by Industries (1974)
Additional Value Rate=Net Additional Value Total/Production Total

Also, for the amount of raw materials, including fuel, used per capita in the aircraft industry, it is about one-third of that for the iron and steel industry and about one-half of that for the automobile industry. (Figure 3)

Key:
- (1) 1 million yen per person
- (2) Iron and steel
- (3) Autombile
- (4) Shipbuilding
- (5) Aircraft
- (6) Electrical
- (7) Machinery
- (8) (Source: Industrial Statistics)

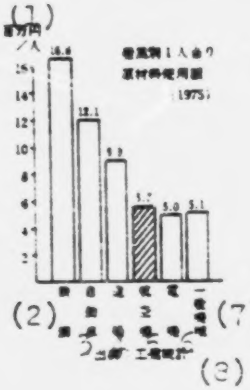


Figure 3. Amount of Raw Materials Used per Capita by Industries (1972)

These figures indicate the high technological intensiveness of the aircraft industry, the tremendous employment opportunities it offers and an industry that conserves materials and saves energy. Furthermore, the aircraft industry extends its influence over a wide spectrum of industries, such as materials, electronic equipment, processing machine tools, etc., and its technological leadership is foremost. (Figure 4)

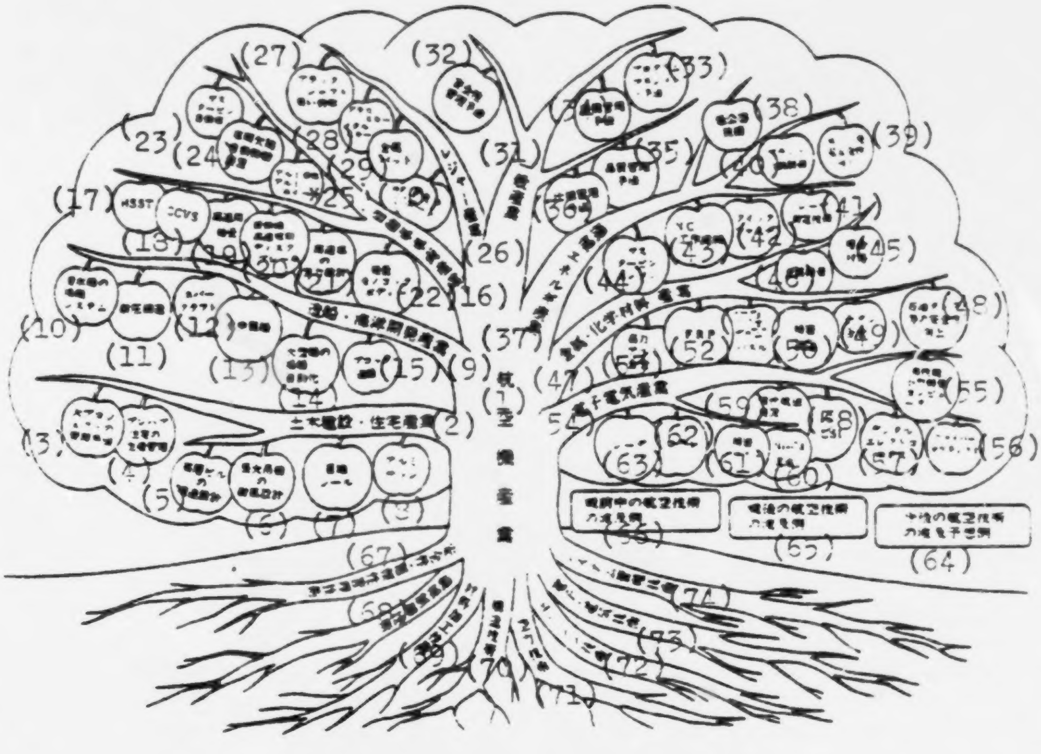

(27)
(32)
(33)
(38)
(39)
(23)
(24)
(28)
(29)
(25)
(31)
(35)
(40)
(17)
HSST
CCVS
(18)
(19)
(20)
(21)
(22)
(16)
(26)
(36)
(43)
(42)
(41)
(45)
(44)
(46)
(10)
(11)
(12)
(13)
(14)
(15)
(9)
(37)
(47)
(52)
(50)
(49)
(48)
(1)
(55)
(3)
(4)
(5)
(2)
(54)
(59)
(58)
(62)
(63)
(61)
(60)
(57)
(56)
(6)
(7)
(8)
(66)
(65)
(64)
(67)
(74)
(68)
(73)
(69)
(70)
(72)
(71)

Figure 4. Far Reaching Effect of Aircraft Industry

[Key on following page]

[Key to Figure 4 on preceding page]

(1) Aircraft industry
(2) Building, construction, housing industry
(3) Management methods with large projects
(4) Production management of prefab housing
(5) Structural design of high rise buildings
(6) Windproof design of long, large suspension bridge
(7) Joint seal
(8) Aluminum sash
(9) Shipbuilding and oceanographic development industry
(10) Steering system of underwater craft
(11) Pressure-proof structure
(12) Hovercraft
(13) Aquatic winged ship
(14) Automated pilot boat of large size ship
(15) Block shipbuilding
(16) Automobile industry
(17) HSST
(18) CCUS
(19) High speed bearing
(20) Bullet express train high speed disk brake
(21) Aerodynamic design of high speed car
(22) Lightweight monocoque body
(23) Gas turbine automobile
(24) Automated diagnosis apparatus for vehicle defects
(25) Aluminum body and aluminum wheel
(26) Travel industry
(27) Black shaft; black pole
(28) Glass ski; metal ski
(29) Metal butt
(30) FRP boat
(31) Industry in general
(32) Safety management methods
(33) Program management method
(34) Maintenance management method
(35) quality control method
(36) Specifications control method
(37) Machinery energy industry
(38) Low pollution technology
(39) Increased safety of nuclear power general
(40) Plant automatic control
(41) Laster measuring technology
(42) Quick fastener
(43) N. C. machine tools
(44) Gas turbine engine
(45) Composite material
(46) Metal soldering
(47) Metal and chemical materials industry
(48) Increased safety of petroleum tank, etc.
(49) Titanium alloys
(50) Precision forging
(51) Honeycomb panel
(52) FRP
(53) High strength aluminum alloy
(54) Electronics and electrical industry
(55) High performance, small type lightweight computer
(56) Fiber optics
(57) Digital electronics
(58) IC LSI
(59) Inertial flight device
(60) Ni-Cd battery
(61) Precision gyro
(62) Loran
(63) Radar
(64) Forecast on the spread of the future aeronautics industry
(65) The spread of the post-war aeronautics industry
(66) The spread of the wartime aeronautics industry
(67) Safety and reliability management technology
(68) Machinery control technology
(69) Materials processing technology
(70) Structural technology
(71) Aeronautics technology
(72) Engine technology
(73) Electronics and electrical technology
(74) Systems control technology

As described above, the aircraft industry is representative of a knowledge-intensive industry and it is expected to play an important role in seeking to upgrade Japan's industrial structure in the future, and it must seek greater progress hereafter.

2. The Present State of Japan's Airacrft Industry

(1) Size of Japan's Aircraft Industry

The annual sales of Japan's aircraft industry have been more than 100 billion yen, more than 200 billion yen in 1975 and about 280 billion yen is 1978. (Table 1) The average increase rate for the past 10 years has been 11.7 percent which can be considered to be a steady growth.

Table 1. Actual Production Output of the Aircraft Industry

(1)	(4)	(5)				(10)		(13)		
		(6)	(7)	(8)	(9)	(11)	(12)	(14)	(15)	(16)
(2) 27	0.3	0	0.2	0.1	0	0.2	0.1	0.1	0.1	0.1
(3) 28	24.5	0	22.4	2.1	0	20.9	3.6	4.2	0.8	19.5
29	24.1	4.3	14.7	4.4	0.7	13.6	10.5	13.4	2.1	8.6
30	30.0	16.1	10.6	3.3	0	16.4	13.6	18.6	5.2	6.1
31	42.5	23.9	14.5	3.2	0.9	23.4	19.1	26.4	6.5	9.5
32	100.6	75.1	19.6	5.6	0.3	72.7	27.9	72.8	8.4	19.4
33	188.3	145.8	21.0	14.6	6.9	154.6	33.7	123.2	11.2	53.9
34	186.6	153.0	14.7	15.7	3.2	149.2	37.4	101.8	17.8	67.0
35	248.4	213.1	20.0	15.1	0.2	184.7	63.7	141.2	30.0	77.2
36	271.9	207.7	17.2	47.0	0	179.9	91.9	135.2	33.3	103.3
37	365.1	259.8	20.0	82.8	2.5	260.2	104.9	166.3	67.2	131.7
38	609.8	490.0	24.9	80.8	14.2	497.8	112.0	268.8	126.3	214.7
39	628.3	607.1	19.6	83.2	18.4	633.1	95.1	336.5	130.1	261.7
40	550.5	409.7	18.9	116.1	5.8	438.6	111.8	251.3	66.3	232.9
41	530.5	343.9	32.6	124.8	29.2	389.4	141.1	192.9	74.7	262.9
42	788.7	466.5	57.0	167.6	97.7	60[illegible].9	186.9	354.8	92.2	341.8
43	922.2	480.4	49.2	218.7	173.9	724.8	197.5	426.7	103.7	391.9
44	985.9	530.1	57.4	269.7	128.7	778.9	207.0	422.9	119.5	443.5
45	1.103.1	709.2	48.9	256.3	88.7	889.6	213.5	442.6	150.8	509.7
46	1.113.9	794.0	37.8	213.6	66.5	906.0	207.9	399.6	180.8	533.5
47	1.348.8	1.091.8	24.8	142.0	90.2	1.151.5	197.3	473.1	251.4	624.3
48	1.757.0	1.469.5	17.3	147.6	122.6	1.551.6	205.4	642.6	303.7	810.7
49	1.994.3	1.734.7	12.2	173.4	74.0	1.757.0	237.3	653.9	351.5	988.9
50	2.392.9	2.078.7	13.5	233.6	67.1	2.109.5	283.4	842.8	460.8	1.089.3
51	2.501.0	2.212.4	12.2	226.7	49.7	2.166.4	334.6	934.4	539.8	1.026.7
52	2.598.2	2.301.6	12.0	221.3	63.3	2.216.3	379.9	922.8	546.1	1.129.3
53	2.793.2	2.404.0	13.4	278.4	97.4	2.340.8	452.4	946.9	572.1	1.274.2
(17) 累計	24.200.6	19.222.4	626.5	3.147.6	1.204.1	20.231.1	3.969.5	9.315.7	4.252.3	10.632.3
(18) 内訳比率	100	79.4	2.6	13.0	5.0	83.6	16.4	38.5	17.6	43.9

Unit value: 100 million yen

Source: Survey and Statistics Section, MITI; however, the breakdown by demand until 1961 is based on survey by The Society of Japanese Aircraft Contractors

Key:
(1) Showa year designation
(2) 27=1952
(3) 28=1953
(4) Production output
(5) Breakdown by demand
(6) Defense Agency
(7) U.S. armed forces
(8) Domestic demand
(9) Exports
(10) Breakdown by operations
(11) Manufacturing
(12) Repair
(13) Breakdown by functions
(14) Airframe
(15) Engines
(16) Equipment
(17) Total
(18) Breakdown by percentages

But in comparison with other industries, it is about one-forty seventh of that for the iron and steel industry, one-forty fourth of that for the automobile industry and one-twenty second of that for home electrical products industry; in other words, its size is very small.

In comparison with the leading nations of the world, it is about one-twentieth of that for the U.S., one-fourth of that for France and Great Britain, and one-half of that for Germany. Like Italy, Japan falls in the so-called fourth group. (Table 2) In terms of GNP percentage, it is 1.8 percent for the U.S. and 1.6 percent for Great Britain while it is 0.17 percent for Japan, and the present situation is that Japan is the lowest among the leading nations of the world.

Table 2. Comparison of Sales with Foreign Countries (1978)

Unit value: 100 million yen

Countries	Aircraft	Engine	Space	Mounted	Totals	Remarks
U.S.	30,493	8,810	17,732	7,295	64,330	
Canada	803	762	--	391	1,956	Space data unknown; not included in total
Great Britain	4,121	3,798	202	2,788	10,908	
W. Germany	6,378	*	632	*	7,010	Data included in aircraft section
France	5,843	2,995	--	2,355	11,193	Space data unknown; not included in total
Holland	686	0	73	68	827	
Italy	1,505	397	69	236	2,207	
Spain					187	Breakdown unknown
Japan	1,698	572	(719)	523	2,793	Space data is approximate for FY 1978 and is not included in the total

The number of employees was 20,000 in 1961 and 28,000 in 1970. There was a decrease to 24,000 in 1977, but with the initiation of the next-generation civil transport (YX) plan plus an increase in defense demands, there was a slight increase to 25,000 in 1978. This figure compared with those of the leading nations of the world indicates that it is about one-thirtieth of that for the U.S., one-eighth of that for Great Britain and one-fourth of that for France. (Table 3)

(2) Demand Configuration and Industry Configuration

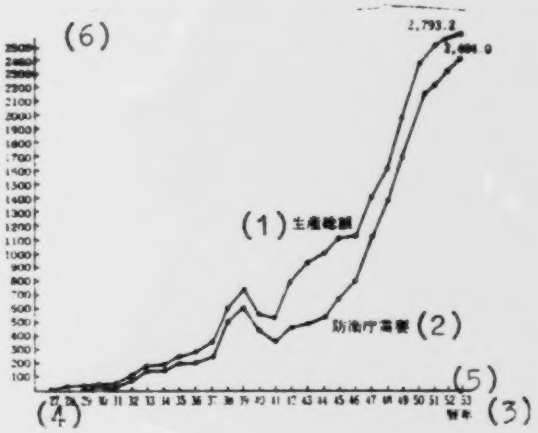
As for the demand configuration (Figure 5) of Japan's aircraft industry, on the basis of the production outputs during the years from 1952 to 1978, the total during the period amounted to 2.42 trillion yen as against the Defense Agency's demand total of 1.92 trillion yen or 79 percent. This figure would reach 82 percent if the U.S. military's special procurement (overhaul, etc., of U.S. military aircraft) is included.

Table 3. Comparison of Employees with Foreign Countries (1978)

Countries	Aircraft	Engine	Space	Mounted Equipment	Totals	Remarks
U.S.	398,000	131,000	83,000	131,000	743,000	
Canada	17,100	10,700	--	6,000	33,800	Space data unknown; not included in total
Great Britain	80,600	63,600	3,200	70,400	217,800	
W. Germany	34,974	7,946	3,111	12,969	59,000	
France	58,760	22,415	--	22,825	104,000	" "
Holland	5,300	--	180	1,920	7,400	
Italy	21,900	5,500	500	4,900	32,800	
Spain					8,000	Breakdown unknown
Japan	13,510	4,553	--	7,335	25,398	Breakdown is estimated according to FY 1977's gross industrial [output] table

Figure 5. Aircraft Industry's Production and the Defense Agency's Demands

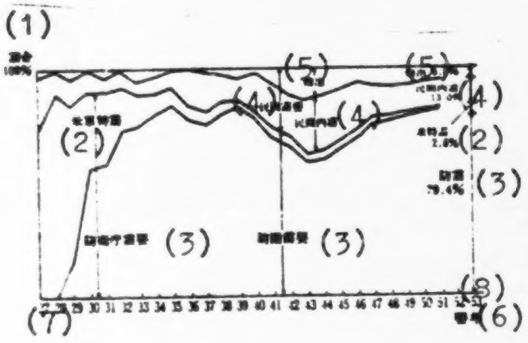
Key:
- (1) total production
- (2) defense agency's demands
- (3) Showa year designation
- (4) 27 = 1952
- (5) 53 = 1978
- (6) Unit value = 1 billion yen



The defense demand including the U.S. military's special procurement showed a value of about 90 percent right after the resumption of the aircraft industry in 1952, but with the stepped-up activity in the production of such civil aircraft as the YS-11 and MU-2, its value dropped to 57 percent in 1968; thereafter, it continued to increase and reached the high percentage of 87 percent in 1978. (Figure 6).

As for the leading nations of the world, the defense demand values are 61 percent for the U.S., 82 percent for West Germany, 77 percent for France and 67 percent for Great Britain, and it is clear that the defense demand with its high percentage supports the foundation of the aircraft industry of these nations. This is especially true in Japan with its heavy dependence on defense demand. Defense demand is determined by national defense policies or national finances, and it is not directly related to such factors as the business operations of the suppliers or

Figure 6. Breakdown by Demand



Key:
- (1) Percentage
- (2) U.S. military's special procurement
- (3) Defense Agency's demands
- (4) Civil demands
- (5) Exports
- (6) Showa year designation
- (7) 27 = 1952
- (8) 53 = 1978

business trends of industries in general. Actually defense demand declined during the years 1965 to 1967, but this occurred because of the decrease in the amount of work during the transitional periods of the Second Defense Build-up Plan (FY 1962 to 1966) and the Third Defense Build-up Plan (FY 1967 to 1971). Because dependence on defense demand is evident more during transition, Japan's aircraft industry is saddled with the basic problem of the defense budget which, unrelated to economics, influences production.

At present, the National Defense Council has decided to procure 100 F-15s as the next generation mainstay fighters by FY 1986 and 45 P-3Cs as the next generation antisubmarine patrol aircraft by 1988, as defense demand. These totals include 82 and 42 aircraft, respectively, programmed to be knockdown, domestically produced. With the FY 1978 to 1980 budgets, 57 and 18 aircraft, respectively, including those imported, have already been secured. Furthermore, the plan to develop the small-size XF-3 turbo-fan engine for mounting on the MTX next generation medium trainer is progressing smoothly and its development is expected to be completed by FY 1985. In this manner it is felt that the aircraft industry as it relates to the defense demands will be actively engaged for some time to come.

If hereafter the aircraft defense budget is going to, like the total defense budget, be increased similar to the rate of GNP growth, then from the standpoint of seeking to expand the scope of Japan's aircraft industry, and from the standpoint of making the dependence on the defense demand, which is big in transition, as a reasonable value, the growth of the civil aircraft industry is all the more a necessity.

3. Development Projects on Japan's Principal Civil Aircraft and Jet Engine for Civil Aircraft

(1) Next Generation Civil Transport (YX) Development Plan

Japan's first, post-war developed aircraft, the 60-passenger, twin-engine turboprop YS-11 transport, received its model certification in 1964 and after its development was completed, the study on the development of the next generation civil transport was begun from around 1967.

At the outset, the plan called for independent development as with the YS-11, but upon receiving a proposal for joint development from the Boeing Co., it took a turn in the direction of the international joint development. In September 1978, the

Civil Transport Development Association, Japan's principal developer, and the Boeing Co. signed the final business contract to develop a civil transport, and in October 1979 manufacture of the experimental model was begun. (Figures 7 and 8)

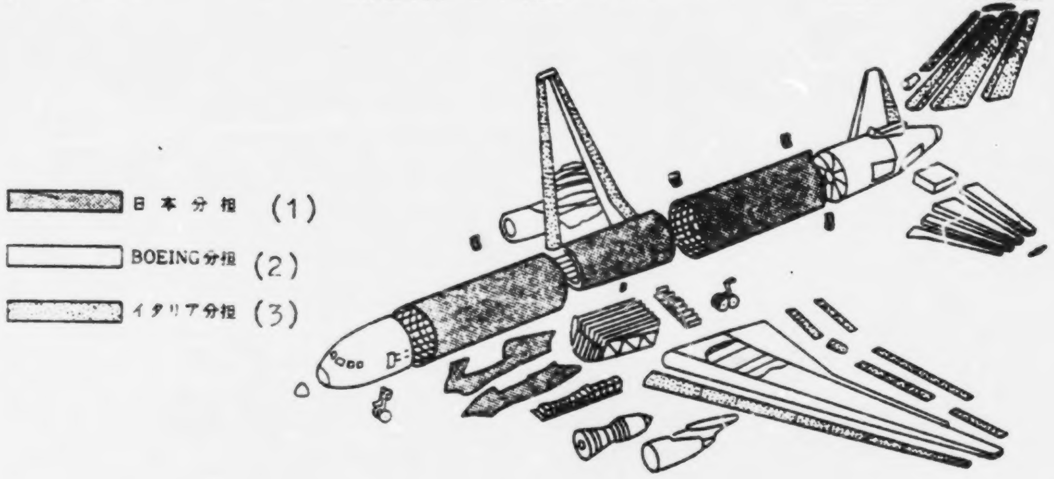


Figure 7. Aircraft Manufacturing Assignments

Key: (1) Japan's assignment (3) Italy's assignment
(2) Boeing Co's assignment

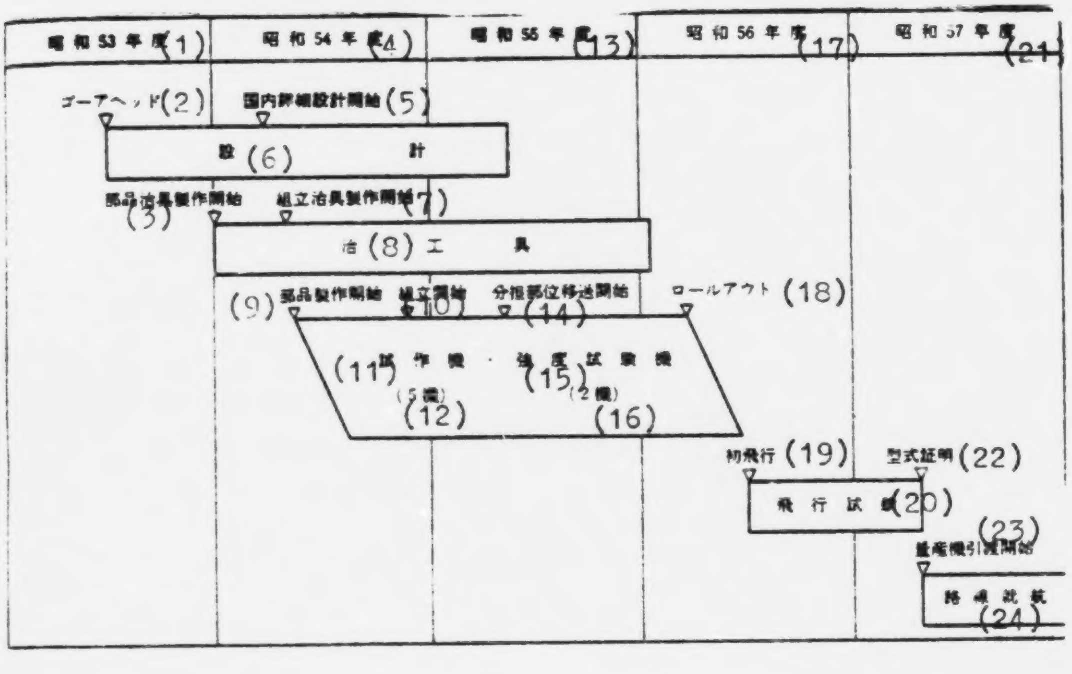


Figure 8. YX Development Schedule (767)

[Key on following page]

[Key to Figure 8]

(1) FY 1978
(2) "Go ahead"
(3) Begin manufacturing metal components
(4) FY 1979
(5) Begin detailed design in Japan
(6) Design
(7) Begin manufacturing assembly metal tools
(8) Metal tools
(9) Begin manufacturing components
(10) Begin assembling
(11) Trial manufactured aircraft
(12) Five aircraft
(13) FY 1980
(14) Begin transferring assigned section
(15) Power test aircraft
(16) Two aircraft
(17) FY 1981
(18) Roll out
(19) First flight
(20) Flight test
(21) FY 1982
(22) Model certification
(23) Begin delivering mass produced aircraft
(24) Placed enroute

The world's passenger transportation demands have achieved an average annual growth of 11.5 percent during the past 18 years. It is reported that hereafter with the slowdown in economic growth, along with the slowdown in the increase of the demands, there will be a steady growth at an average annual growth of about 7.2 percent. With reference to the transport that would meet the demands, throughout the world there were 6,458 aircraft in 1978, but forecasted are about 7,000 aircraft in 1985 and about 10,000 aircraft in 1995. Along with the tightening of noise control and the absolescence of existing aircraft, it is reported that a large switchover in demands will occur by the middle of the 1980's.

The YX plan calls for the development of the B-767 and B-777, the new type jet passenger aircraft, programmed for the market in the 1980's. The YX will adopt an advanced wing type; will have the airframe weight reduced through use of composite materials; will utilize the most recent technology such as in reduced noise nacelles and high accuracy, high reliability control systems; and the salient selling points of the plan will be low fuel costs, reduced noise and comfortable passenger cabins. The B-767 will have a seating capacity of from 200 to 300 seats, flight range of about 5,000 km and a capability to take off and land at a 1,800 m class airport.

Japan will assume about 15 percent of the airframe development operations, mainly the fuselage, the wing-fuselage faring and a part of the main wing. Based on the subcontracting agreements with the Civil Transport Development Association, the Mitsubishi Heavy Industries, Ltd., Kawasaki Heavy Industries, Ltd. and Fuji Heavy Industries, Ltd. have engaged in development manufacturing of their allotted assignments. In turn the Mitsubishi Heavy Industries, Ltd. and Kawasaki Heavy Industries, Ltd. subcontracted the Shin Meiwa Industry Co., Ltd. and the Japan Aircraft Co., Ltd. to engage in development manufacturing.

Japan has just about completed the detailed plans for the assignments allotted her thus far and presently metal tools and components are being manufactured. Japan is scheduled to begin transferring her assigned items to Boeing Co. from this summer. Thereafter, Boeing Co. is programmed to undertake the final assembly operations, begin flight tests from July 1981, acquire its model certification in August 1982 and begin delivering the aircraft to the various airlines.

The B-767 has a tremendous headstart for already 12 firms have placed orders for 284 of this aircraft (134 of them on option) and this total includes the 40 aircraft ordered by the All Nippon Airways Co., Ltd.

Also Japan's component makers have received orders for apparatus, components, etc. directly from Boeing Co. Already 10 firms have received orders exceeding the sum of 15 billion yen.

In this manner, the XY plan is a project that has upgraded the overall capability of Japan's aircraft industry and the government is programmed to give positive support by granting a subsidy (one-half of the financial assistance) amounting to 16.8 billion yen during the 5-year period from FY 1979 for the development operations of the Civil Transport Development Association.

(2) Japanese-British Joint Development Plan (XJB Plan) on an Aircraft Jet Engine

The XJB Plan is based on the technological knowledge accumulated from such projects as the FJR Project which is the aircraft jet engine development plan that was pursued as a large-scale project system by the Agency of Industrial Science and Technology of MITI. The joint development agreement between Japan's three jet engine manufacturers (Ishikawajima-Harima Heavy Industries Co., Ltd., Kawasaki Heavy Industries, Ltd. and Mitsubishi Heavy Industries, Ltd.) and the British Rolls Royce Co. on the XJB Plan to develop a jet engine (engine model RJ 500) for civil aircraft with a trust of about 9 tons was signed in December 1980 (sic).

The XJB will be a fanjet engine with a by-pass ratio of 4.8 to achieve reduced noise, low fuel cost and reduced pollution, and is programmed to be mounted to a 130-passenger class twin engine transport. The period of development is 8 years, from FY 1980 to 1987. (Figure 9) The total cost of the development is estimated to be about 140 billion yen to be shared on a 50-50 basis by Japan and Great Britain. As to the development assignments, (a) the basic design will be worked on jointly, (b) on specific designs and engine tests, Japan will oversee the fan, low pressure turbine, etc. and Great Britain will be charged with the compressor, combustor, high pressure turbine, etc. and (c) the complete assembly and final tests will be performed jointly.

A joint company with equal capitalization between the Japanese and British was established on 3 April 1980 to implement the coordination of developing and manufacturing the XJB. The sales of the engines, project support, etc.

4. Outlook of Japan's Aircraft Industry

(1) Civil Aircraft Development Plans After the YX

The Industrial Structure Council, in its report "What our international trade and industry policies during the 1980's should be," published in March 1980, proposed the active promotion of development plans to follow the YX and XJB Plans; and the policy committee of the Aircraft Industry Council stated, "On the development of a 100-seat class or a slightly larger type aircraft, as regards the development of a civil transport after the YX, studies will be continuously made on problems of the partner in an international joint development arrangement and on the relationships after the YX-11 (sic), for a positive development plan." These are extracts from interim reports.

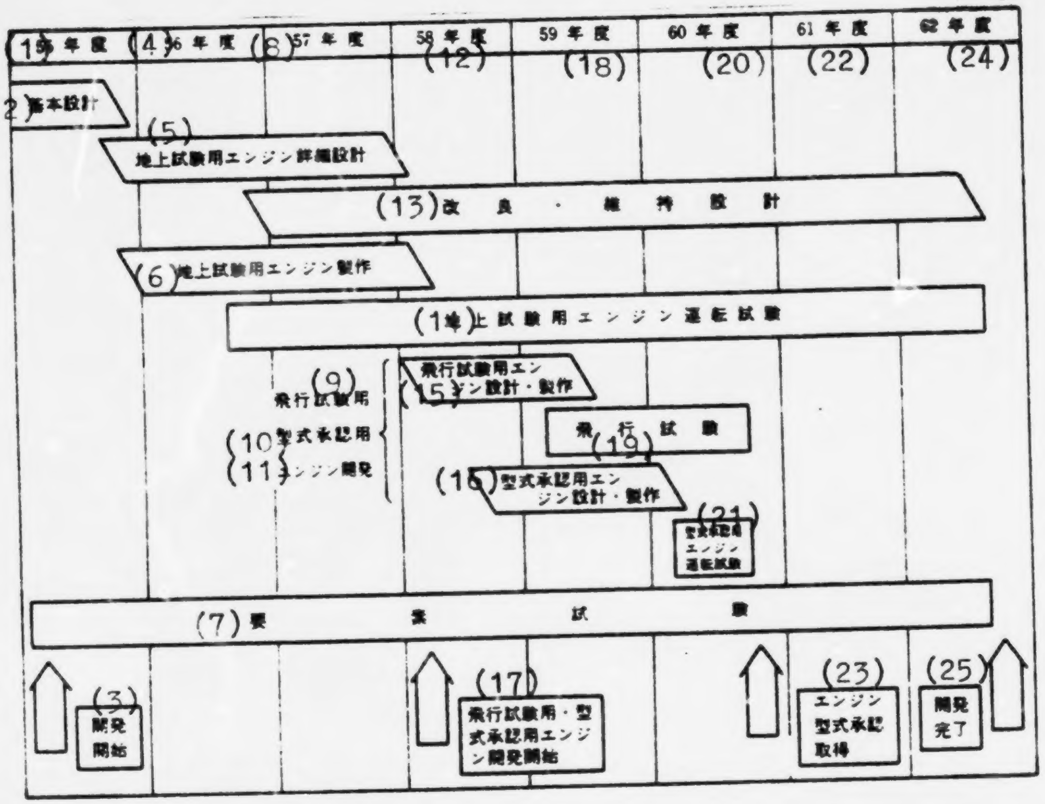


Figure 9. XJB Development Schedule

Key:
(1) FY 1980
(2) Basic design
(3) Begin development
(4) FY 1981
(5) Detailed design of ground test engine
(6) Manufacture ground test engine
(7) Element test
(8) FY 1982
(9) For flight test
(10) For model approval
(11) Engine development
(12) FY 1983
(13) Improvement/maintenance design
(14) Operational test of ground test engine
(15) Design and manufacture of flight test engine
(16) Design and manufacture of model and certified engine
(17) Begin development of flight test/model certified engine
(18) FY 1984
(19) Flight test
(20) FY 1985
(21) Operational test of model certified engine
(22) FY 1986
(23) Acquire engine model certification
(24) FY 1987
(25) Development completed

The following are summaries of joint development proposals submitted by foreign countries, as of the present:

(1) Proposal by Fokker Co.

The Dutch aircraft manufacturer, the Fokker Co., has under study a plan to newly develop a twin-engine jet aircraft with a passenger capacity of about 130 seats and a flight range of about 2,800 km. It has made overtures to have Japan manufacture the main wing.

(2) Proposal by Airbus Industrie Co.

The Airbus Industrie Co. is a joint enterprise, consisting of France, West Germany, Great Britain and Spain, and it has plans of newly developing the SA-1 (Single Aisle) twin-engine jet aircraft with a passenger capacity of about 110 to 130 seats and the SA-2 with 160 seats. A study period of about 2 years is considered a necessity. One proposal is to have Japan join the partnership and assume about one-fourth of the assignments.

(3) Proposal by Dassault Breguet Co.

Dassault Breguet Co., a French aircraft manufacturer, has continued studies on its twin-engine jet aircraft, Mercourou, with a passenger capacity of 120 to 150 seats. It has sent overtures to Japan to participate and undertake the improvement of a part of the aircraft.

(2) Direction of Japan's Aircraft Industry Policies Hereafter (Conclusion)

The progress achieved by Japan's aircraft industry is attributable (1) to the untiring efforts exerted by the aircraft manufacturers themselves in bringing about this situation and (2) like in the highly advanced nations, to the support rendered by the government with its policies which became of tremendous help. The policies of Japan's aircraft industry hereafter, while following a part of the policies instituted thus far, must expand with the following three principles as bases:

First is adherence to an unrestricted aircraft trade policy. For this, as pertains to civil aircraft and its components, (1) eliminate import duties, (2) eliminate limitations on import quantities and (3) watch that government assistance will not exert a bad influence on aircraft trade. These are provisions of the Multilateral Trade Negotiations Civil Aircraft Pact reached in agreement last year by the United States, EC, Sweden and Japan. Recently, on the issue of Japan's automobile exports to the United States, Mr Fraser, president of the United Auto Workers, at the public hearing at the joint economic committee of both houses of Congress, made the statement that "On importing aircraft, our country places an obligation on local contents," but with Defense Agency aircraft, to some extent domestic manufactured ones are guaranteed from the standpoint of maintaining the country's security, but on importing civil aircraft, there has never been any instance of placing obligation on what he referred to as local contents. In this manner, Japan today and hereafter will be a strong advocate of free trade on civil aircraft, and Japan's aircraft industry will not only rely on the domestic market, but it will seek world markets and strive for aircraft development that will be highly competitive businesswise.

The second principle is, on Japan's aircraft development in the future when the size of the aircraft project is greater than a predetermined level, to enter into an international joint development arrangement. Aircraft development essentially is inherent with large risks in the market on capitalization and technology. Spreading this risk by international joint development is the general practice among the principal nations in their aircraft development policies. Such aircraft as the Concorde, the A-300 and A-310 of the Airbus Industrie Co. are based on international joint development and even in Japan the YX and XJB are engaged by international joint development. Civil aircraft development after the YX will probably follow suit.

The third principle is that the final risk in aircraft development should not be borne by the government but by the private industries. In Europe, aircraft or engine development is undertaken by state operated companies such as the British Aerospace Co. and Rolls Royce Co. of Great Britain, Aerospecial Co. and SNECMA Co. of France, Aeritalia Co. of Italy. In the case of the YS-11 in Japan, the semi-governmental Japan Aircraft Manufacturing Co. engaged in development and production, and the government assumed a part of the final risk. However, after the YX, the government has taken the following stances: (1) in order to have the maximum involvement of the full strength of a civilian enterprise in aircraft development, a state operated company will not be a participant, (2) even if financial assistance is rendered by the government in the development stage, such funds will be returned to the government should the project be successful and (3) special assistance will not be rendered at all during production, and in sales Japan will probably maintain these policies in the future.

It is felt that with the active promotion of the aircraft industry policies based on the above three principles, along with greater efforts expended by private industries, Japan's aircraft industry attaining first rate level of the world is in the not too distant future.

Space Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6, Jun 80 pp 28-31

[Article by the Space Industries Office, General Affairs Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. The Progress of Space Development and Its Practical Application

Since the launching of mankind's first artificial satellite, Sputnik 1, by the Soviets in 1957 and up until today, more than 2,000 artificial satellites have been launched by 15 countries and two international agencies.

During the period, the diversified uses and functions of the artificial satellites have been remarkable and from these various areas, within 10 years from the successful launching of Sputnik 1, satellites for practical use were developed for truly inspiring advancements. (Table 1) In the area of the earth observation satellite, since the launching of Landsat-1 in 1972, its usefulness has been widely acknowledged, and President Carter in November 1979 approved the jurisdictional transfer of the Practical Earth Observation Satellite Plan from NASA to the Department of Commerce for its continued activity.

Table 1. The World's First Satellites for Practical Application

Purpose	Year launched	Name of Satellites	Launched Rocket	Remarks
Stationary inter-station communications	1965	INTELSAT-1	Thor Delta	Communications between Europe and America
Ocean communications	1975	Navsat	Thor Delta	
Navigation support	1963	Navsat	Scout	Military use
Meteorological observation	1966	ESSA-1	Thor Delta	
Geodetic satellite	1964	Anna-1	Thor A Blue Star	Military use

As described above, the United States and the USSR are the principal contributors to the advancement of space development. And now, to describe the situation in Japan.

Japan's space development began in 1955 with a budget of slightly under 20 million yen when the University of Tokyo undertook research and development of solid propellant rocketry to develop a space observation rocket. In 1970, the "Osumi" was launched by the University of Tokyo, making Japan the fourth nation in the world to launch a satellite. Since then and up to the present, 11 satellites for scientific research and nine satellites for practical application, or a total of 20 satellites, have been launched, thereby giving Japan recognition as a member of the space-advanced nations (Table 2).

Even the size of the budget shows growth in that for FY 1980 the total almost reached the whopping 100 billion yen mark for the first time. A comparison of the various countries and budgets up until 1978 shows that Japan ranks second largest next to the United States amongst the Western nations. (Figure 1)

Figure 1. Budget on Space Development by Countries

Key:
(1) Unit value = 100 million yen
(2) Japan
(3) France
(4) Germany
(5) Great Britain
(6) United States
(7) Japan
(8) France
(9) Germany
(10) Great Britain

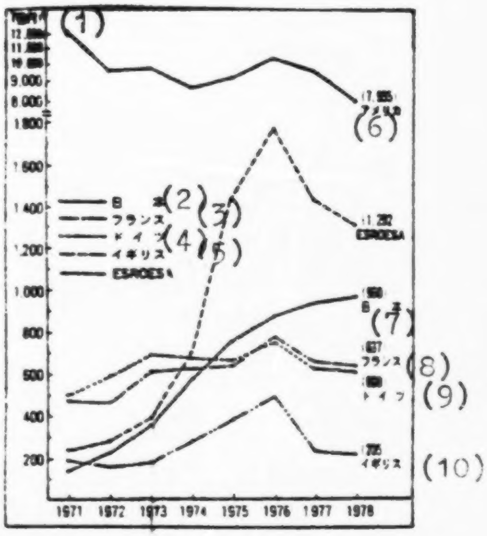


Table 2. Performances of Japan's Past Artificial Satellites Launched and Plans

Shows Year Designation	University of Tokyo		National Space Development Agency of Japan (NASDA)		
	M Rocket	Others (Using U.S. Space Shuttle)	N-1 Rocket (about 130 kg on stationary path)	N-2 Rocket (about 350 kg on stationary path	U.S. Rocket (Delta 2914 (About 350 kg on stationary path)
44	← "Osumi"				
45	Experimental satellite ← "Tansei"				
46	Scientific Satellite 1 (MS-F2) ← "Shinsei"				
47	Scientific Satellite 2 ← (REXS) "Denpa"				
48	Experimental Satellite ← "Tansei-2"				
49	Scientific Satellite 3 ← (SRATS) "Taiyo"				
50			Engineering test ← satellite I (ETS-1) "Kiku" Ionosphere sounding ← satellite (ISS) "Ume"		
51	Experimental ← Satellite "Tansei-3"		Engineering test ← satellite II (ETS-II) "Kiku-2"		
52	Scientific Satellite 5 ← (EXOS-A) "Kyokko"		Ionosphere sounding satellite ← (ISS-b) "Ume-2"		Geostationary meteorological satellite ← (GMS) "Himawari" Medium capacity communications satellite for experimental ← purpose (CS) "Sakura" Medium scale broadcasting satellite for experimental purpose ← (BS) "Yuri"

[Table 2 continued]

Shows Year Designation	University of Tokyo		National Space Development Agency of Japan (NASDA)		
	M Rocket	Others (Using U.S. Space Shuttle)	N-1 Rocket (about 130 kg on stationary path	N-2 Rocket (about 350 kg on stationary path)	U.S. Rocket (Delta 2914 (about 350kg on stationary path
53	← Scientific satellite 6 (EXOS-B) "Jikiken" ← Scientific satellite 4 (CORSA-b)		← Experimental communications satellite (ECS-a)* "Ayame"		
54	← Experimental satellite "Tansei-4"		← Experimental communications satellite (ECS-b)* "Ayame-2"		
55	⇦ Scientific satellite 7 (ASTRO-A)			⇦ Engineering test satellite IV (ETS-VI) (sic)	
56			⇦ Engineering test satellite III (ETS-III)	⇦ Geostationary meteorological satellite 2 (GMS-2)	
57	⇦ Scientific satellite 8 (ASTO-B)	⇦ Space experiment with particle accelerators (SEPAC)		⇦ Communications satellite 2a (CS-2a)	
58	⇦ Scientific satellite 9 (EXOS-C)			⇦ Communications satellite 2b (CS-2b) ⇦ Broadcasting satellite 2a (BS-2a) ⬅ Geodetic satellite (GS-1)	
59	⬅ Scientific satellite 10 (PLANET-A)			⇦ Marine observation satellite 1 (MOS-1)	
60					⇦ Broadcasting satellite 2b (BS-2b)

← Artificial satellite launching completed
⇦ Launching of artificial satellite planned (in development stage)
⬅ Artificial satellite whose launching is requested (in research development stage)
* Artificial satellite whose launching was a failure

Table 3. Japan's First Satellites for Practical Application

Purpose	Year Launched	Name of Satellites	Launched Rocket	Remarks
Stationary inter-station communications	(1982)	Communications Satellite 2a	N-II	Domestic communication
Broadcasting	(1983)	Broadcasting Satellite 2a	N-II	Domestic Broadcasting
Meteorological observation	1977	Geostationary Meteorological Satellite "Himawari"	Delta	GARP Plan participation

It can be substantially called Japan's first practical satellite.

Plans are also underway to launch practical satellites for communications and broadcasting purposes and Japan can be said to be on the threshold of entering the era of practical application.

2. Concepts of the Space Industry

Any industry that supports space development activities such as launching an artificial satellite is called a space industry. However, the ramifications of the space industry are so wide in scope that defining them would be a task. This is all the more so because of the difficulty in forecasting the possible emergence of new industries with the era of space development for practical applications already ushered in. A bold definition would be "an industry that furnishes equipment and services for space development and use," and this would include in addition to the manufacturing of rockets and artificial satellites, the ground facilities, the manufacturing of data receiving, processing and analysis apparatus as well as the development and transportation of software, etc., as relates to the above.

The Japan Machinery Industry Federation conducted a "Fact Finding Survey on the Space Industry" in October 1979. The survey was conducted with private enterprises that were assumed to be related to the space industry and replies were received from 6[illegible] companies. A breakdown by industries revealed the iron and steel industry, chemical industry, electrical machinery and equipment manufacturing industry, machinery and equipment manufacturing industries in general, export machinery and equipment manufacturing industry, precision machinery and equipment manufacturing industry, rubber products manufacturing industry, wholesale industry, information service industry, installation and construction industry, but on the basis of the substance of the industries mentioned above, such industries as the non-ferrous metal manufacturing industry (materials such as aluminum and titanium), metal products manufacturing industry (heat treatment) would be included.

3. Present State of the Space Industry

The above fact finding survey on the space industry is the first of its kind, but because of the conditions described by the responding private businesses, portions of the survey are inaccurate. This survey is of tremendous significance from the standpoint of furnishing a general picture of the space industry for the first time. It will be used as a basis in describing the present state of Japan's space industry.

(1) Structural Private Business

Private business engaged primarily in space activity, like the Mitsubishi Space Software and the Nippon Propellant Industry, are few. And even if a company establishes a space section and engages in it wholeheartedly, from the standpoint of its share in the total sales, its contribution is not great. Thus, the percentage of the total sales of a space section versus that of a space specialty company is a mere 0.4 percent and in terms of working personnel about 1 percent. In other words the contribution of space activity is very small (FY 1978).

From the standpoint of business organizations, the three giants in space activity are Mitsubishi Heavy Industries, Ltd., Nissan Motor Co., Ltd. and Ishikawajima-Harima Heavy Industries, Ltd. As for satellite and ground facilities, the all around electrical manufacturers, such as Nippon Electrical Co., Ltd., Mitsubishi Electric Corporation, Toshiba Corporation and Fujitsu, Ltd., have been assuming big roles. Actively engaged in business with these firms are the many private enterprises such as trading firms, electrical component makers (Murata Manufacturing Co., Ltd.) and software (Nippon Electronics Development and Nippon S. D. C.)

(2) Sales

Sales of the space industry from FY 1975 to 1978 are shown on Table 4. Sales totalled 105.4 billion yen during FY 1978 while the 4-year total was 379.7 billion yen or an average growth rate of 6.5 percent. The breakdown is: launched body including rocket, satellite, etc., about 52 percent; ground facilities, about 41 percent and software, about 8 percent, so that the flight and ground portions are about the same.

Since the bulk of Japan's space requirements is assumed by the government's space activity, the total of 355.9 billion yen is just about the same as the space budget during the given periods.

(3) Exports and Imports

Exports of the space industry have been increasing by the year and the total amount from FY 1975 to 1978 was 57.3 billion yen. Because of export restrictions on the launched body, the amount was a mere 1.9 billion yen which was for the transponders and other items made principally by Nippon Electrical Co., Ltd. and Mitsubishi Electric Corporation. The special components used have been considered to be of world standards and much is expected hereafter. Semiconductors and other electronic components are reportedly used to some extent for space projects in the United States and Europe, but the scope and details are unknown. The amount of 55.3 billion yen for ground facilities constitutes 97 percent of the total exports. These were principally for the Intelsat ground stations and it is reported that Japan's manufacturers furnish one-third to one-half of the needs of the world's ground stations. That this is Japan's forte is only natural because Japan's electronic and communications technologies are of world standards. The amount for software is only 100 million yen, considerably lower than the others, but its growth is anticipated hereafter.

Table 4. Total Sales from 1975-1978

Showa year designation Principal items	Performance; unit value is 100 million yen				Total for 1975-1978 inclusive	
	1975	1976	1977	1978		Breakdown percentages
Rockets	184	203	173	191	751	19.8
Artificial satellites	288	263	221	304	1,706	28.3
Components of rockets and artificial satellites	28	26	33	36	123	3.2
Equipment for space in-flight use (includes equipment for space shuttle mounting)	0	0	2	7	9	0.2
Launched bodies	500	492	429	538	1,959	51.6
Ground stations	245	327	202	364	1,138	30.0
Data receiving, processing and analysis apparatus	94	120	93	106	413	10.9
Ground facilities	339	447	295	470	1,551	40.8
Software development	26	69	95	33	223	5.9
Data processing and analysis	9	14	28	13	64	1.7
Software	35	83	123	46	287	7.6
Total	874	1,022	847	1,054	3,797	100.0

Remarks: Subsystems for communications, heat control, second stage propulsion, etc. are included in the rocket, equipment for space in-flight use and the artificial satellite. The same for the items below.
Components of rockets and artificial satellites refer to machine components, electrical components, heat processed components, etc. The same for the items below.

Although a descending trend in imports is noted, the total amount of imports from FY 1975 to 1978 was 107.5 billion yen, indicating an unfavorable trade balance of 50.2 billion yen. The breakdown is: launched bodies, 73 percent, ground facilities, 18 percent and software, 9 percent. Only the subject of ground facilities showed a favorable trade balance to the amount of 36.3 billion yen.

(4) Investments on Facilities, Etc.

Excluding the facilities and other items included in the orders of the National Space Development Agency of Japan (NASDA), private business invested a total of 13.2 billion yen of their capital in facilities from FY 1975 to 1978 and spent a total of 13.7 billion yen for research and development. The ratio of research and development expenses to total sales is 3.6 percent which is almost the same (3.7 percent) for communications, electronic and measuring equipment.

4. Future Outlook on the Space Industry

In comparison with the expendable type rockets used heretofore for space travelling, the United States has developed the extremely economic space shuttle whose maiden flight is programmed during 1980-1981. Because the transportation of a 1 kg payload into space can be realized at the low rate of a mere $1,000 through this method, interest in the practical use of space has accelerated not only in the government, but also among private interests, and a rapid expansion of the market is anticipated.

NASA's outlook up until the 21st century is as follows: Develop such prospective technologies as space construction and convert existing type satellites to larger scale with higher performances, from 1980 to 1987; employ an improved space shuttle to realize a transportation cost of $250 per kg payload, construct a large-scale station to serve as a base to assembly structural materials at low orbit, thereby entering the era of practical application with low orbit space utilization, from 1988 to 1995; and then employ a heavy lift launch vehicle (HLLV) to realize a transportation cost of $30 per kg, launch into geostationary orbit a solar power satellite (SPS) that would generate several million KW of electric power for use on earth and to engage in full scale construction of a space structure that would operate as a space plant, from 1996 to 2005. NASA has been making steady progress with these projects.

In Europe, the Arianne rocket is being developed to compete against the space shuttle and the recent establishment of a company to manage it with France taking the lead and other activities indicate their tremendous participation to gain a share of the practical utilization of space.

In light of these world trends, Japan has plans to launch numerous satellites, has pushed on to develop application satellites such as the Geostationary Meteorological Satellite 2 and Communications Satellite 2 for certain substantial functions, and to develop such satellites as the Marine Observation Satellite 1 that would be the first step in developing earth observation satellites for future practical application (see Table 2). MITI, besides planning for the positive development of a resources and energy policy, plans to promote an active space industry by conducting investigative research with resource exploration satellites in order to upgrade space technology.

Thus, hereafter, by coping smoothly with the enlarging market of the lively space activities at home and abroad, Japan can expect a tremendous growth of her space industry and the prospects are boundless.

Atomic Energy Apparatus Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6, Jun 80 pp 32-35

[Article by the Electronic Apparatus and Electric Machinery Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. History of Its Development

The history of Japan's atomic energy development begins with the appropriation of an atomic energy budget in 1954 following President Eisenhower's "Atoms for Peace" proclamation in 1953. The world's atomic energy development was limited to the generation of electricity from atomic energy, the world's first by the United States in 1951, and Great Britain constructing the Calder Hall type nuclear power station in 1954. The First International Conference on the Peaceful Uses of Atomic Energy (Geneva Convention) in 1955 caused the world's established by 1956.

(1) 1956: The Atomic Energy Commission (AEC) was established. The Japan Atomic Energy Research Institute (JAERI) was established as a foundation in 1955 and then changed to a special corporation in 1956. The Japan Atomic Fuel Corporation was established and changed to the Power Reactor and Nuclear Fuel Development Corporation in 1967.

(2) 1956: The Japan Atomic Industrial Forum (JAIF) was established; the Mitsubishi Atomic Power Industries, Inc. (MAPI), consisting of Mitsubishi corporations, was established in 1955; the Tokyo Atomic Industrial Consortium (TAIC), consisting of Hitachi, Ltd. and other companies; the Sumitomo Atomic Energy Industries, Ltd. (SAEI), consisting of Sumitomo corporations; Nippon Atomic Industry Group, Ltd. (NAIG), consisting of Mitsui corporations and the First Atomic Power Industry Group (FAPIG), consisting of Fuji Electric Co., Ltd. and other companies, were successively established. Today the Atomic Energy Group is comprised of these consortiums.

The most complete nuclear reactor then was the GCR type reactor of Great Britain which had been the first nation in the world to consider developing nuclear power generation as an energy source, after the Suez crisis. Japan sent a survey mission to Great Britain in 1956 to study the GCR reactor and this survey became the basis to plan for the early realization of nuclear power generation. After the famous Shoriki-Kono debates, the Japan Atomic Power Company (JAPC) was formed to import the GCR reactor.

In the midst of negotiations to import the GCR reactor, the United States began making overtures for importing a light water reactor and it was decided to bring in the JPDR power demonstration reactor to JAERI in 1959. Prior to this, nuclear research at JAERI was progressing smoothly for in 1956, the JRR-1 (water boiler type) and subsequently the JRR-2 (CP-5 type) were imported from the United States; at the same time, the conceptual design of the first domestically manufactured reactor (JRR-3: natural uranium heavy water type) was completed in 1956 and its criticality was decided in 1962. Japan decided to import the GCR type from Great Britain as its first commercial-use power reactor, but the FAPIG with Fuji Electric Co., Ltd. as leader subcontracted with the British GEC to participate in its construction. This reactor began operating in 1966, but the percentage of domestic manufacture of this reactor was about 35 percent and the bulk of the main apparatus was imports.

But just as the Nuclear Industries Section mentioned in its report in 1960 that "the prospect of nuclear power generation competing against fuel oil thermal generation will occur around 1971," nuclear power generation encountered a slowdown period because of such reasons as the drop in petroleum prices with successive discoveries of petroleum resources and the drop in thermal power costs with technological progress.

According to the survey by JAIF, nuclear power sales reached the sum of 13 billion yen in 1963 after which sales decreased for 3 years, and the research expenditures of the nuclear power supply industry constituted about 40 percent of the total expenditures. Generally during the period from 1956 to 1965, Japan's nuclear power development had just started, widely outdistanced by the industrially advanced nations of Europe and the United States, and the stage was set to prepare for practical utilization by having industries accumulate technological knowledge.

In 1966, the AEC decided on a policy "to develop the fast breeder reactor and new type converter as national projects, and to step up independent development in an all out effort with government and private resources to the allowable limit," and the Power Reactor and Nuclear Fuel Development Corporation was established in 1967. At the same time, by reconsidering the economic factor of the light water reactor (600,000 KW/BWR) which was based on the American Oyster Creek reactor, Japan heightened its interest on nuclear power generation.

The JAPC commenced constructing the Atsuga power plant (BWR: 35; 70,000 KW) in 1966 and successively began constructing nuclear power stations such as the Tokyo Electric Co's Fukushima power plant, Kansai Electric Co.'s Mihama power plant and the Chugoku Electric Co's Shimane power plant.

This nuclear power boom can be discered for the nuclear power outlay by the electric companies during the slowdown period was around 5 billion yen whereas the outlay for FY 1969 was ten times greater, having reached 59 billion yen. Then the long range plan of the nuclear power development and use of the AEC underwent an increased revision when the 30 million to 40 million KW [output] programmed for 1985 in the 1967 policy was increased to 60 million KW programmed for 1985 in the 1972 policy revision.

The nuclear power development at the outset was programmed for imports, as described in the 1964 report of the Nuclear Industries Section below.

In order to develop nuclear power generation efficiently, in the initial stage, along with importing reactor types already in practical use abroad, electric company personnel must exploit their individual experiences to mutually cooperate and develop comprehensive plans. In case equipment and materials are required, then related manufacturers must be established and as much as possible the conversion to domestic manufacturing must be expedited.

Japan's nuclear reactor manufacturers signed technical tie-up contracts with American light water reactor manufacturers during the early years of the 1940's and began as subcontractors to General Electric and Westinghouse in making the first reactor; thereafter, the Japanese manufacturers became the principal contractors and gradually strengthened their system for domestic manufacture.

Fuel manufacturing began with GE, Hitachi and Toshiba forming the JNF, then the Sumitomo Nuclear Fuel Co., Ltd. and Mitsubishi Nuclear Fuel Co., Ltd. were established in the mid 1940's, laying the groundwork for the present situation.

The nuclear power industry grew steadily with these activities and nuclear power sales surpassed the huge 100 billion yen mark for the first time, in FY 1972, to reach the sum of 117.8 billion yen. (The financial outlay for the same year was 125.9 billion yen.)

On the other hand, the economic growth rate had dropped along with the lag in power requirements after the oil shock, and so under these conditions, high hopes had been placed on the fully economical nuclear power generation to replace the expensive petroleum thermal installations, but at the same time the problem of locations for nuclear generation arose.

Then in 1974, three laws on power source were enacted to facilitate the construction of power plants. These were the law on environmental zoning of power installations, tax law to promote power source development and a special audit law to promote power source development.

The report of the Supply-Demand Section of the Advisory Committee for Energy in 1975 revised the nuclear power generation goal for 1985 to be 49 million KW; in 1978, the AEC in its revised long range plan made a decreased revision of from 27 to 33 million KW; then in December 1979, the report of the Electric Supply Section of the Electric Industry Council further revised it to be 28 to 30 million KW and presently efforts are directed to reach this goal. The above reports forecasted the power source output at the end of FY 1990 to be 51 to 53 million KW and that for the end of FY 1995 to be 74 to 78 million KW.

2. Present State and Future of the Nuclear Power Apparatus Industry

The nuclear power apparatus industry accounted for sales totalling 580 billion yen in FY 1978 and among other things has progressed in research and development of nuclear power to expand steadily. However, the expenditures alone may give the impression of a brightening future, but actually the prospect for settlement of the accumulated deficits is dim. The locational problem has caused purchases to be unstable and business finances have remained unstable.

Exports constitute only a small percentage of the total sales, but growth in the future to develop into an export industry is anticipated; however, because of such factors as the slackened tempo for constructing nuclear power plants abroad at the present time, rapid progress cannot be anticipated.

Technologically the conversion to domestic manufacture of apparatus has reached advanced levels, the efforts for revision and standardization undertaken since FY 1975 have yielded results and considerable technological know-how has been attained.

Revision and Standardization

Because of the frequent occurrences of trouble with the imported light water reactor and the move to standardize plants which are to be installed abroad, the revision and standardization program was begun with government and private industry cooperating on a 6-year plan from FY 1975 to upgrade the availability factor (the first phase revised and standardized plant had a time availability factor of about 75 percent and the second phase of about 80 percent), improve reliability and minimize exposure. (Table 1)

Table 1. Objectives of a Standard Plant

	Plants in the past	First phase standard plant	Second phase standard plant	Measures Taken
Number of days for scheduled inspection	90-100 days (no repairwork needed)	About 85 days	About 70 days	Acceleration of fuel exchange, etc.
Operating time percentage	Wide differences depending on plant	About 75 percent	About 80 percent	SCC-proof measure
Exposure of workers	(using 100 as whole)	65-75	30-50	Install automated ISI equipment

Remarks: To determine operating time percentage, if scheduled inspection lasted 90 days and the plant was in operation the rest of the year, then 365-90/365+75 percent. Generally nuclear power plants are closed during the summer inspection, etc.

(1) First phase revision and standardization (FY 1975-1977)

Minimize exposure to the employees and upgrade operating efficiency by enlarging the container, etc.

(2) Second phase revision and standardization (FY 1978-1980)

Revise the apparatus, system, etc. and broaden the scope of standardization with the first phase revision and standardization as basis.

First phase revised standard reactors currently under construction are the PWR as the first one at Kawauchi and the BWR as the second one at Fukushima #2. It must not be forgotten that in nuclear power development, from the time the safety inspection is completed, to plant construction and until its operation would require a long period of 5 or 6 years, and subsequently certification of its technological assessment would be made way later.

From the standpoint of easing the location problem, reliability demonstration tests of the principal apparatus of a nuclear power plant were made from FY 1975, and besides the six tests, enumerated below, recommended by MITI offices, such agencies as the Science and Technology Agency are recommending such tests as the "Container spray effect demonstration test" and the "Large type submersion effect demonstration test."

(1) Steam generation reliability demonstration test.

(2) Valve reliability demonstration test.

(3) Fuel assembly reliability demonstration test.

(4) Welded and heated areas reliability demonstration test.

(5) Pump reliability demonstration test.

(6) Nuclear power generation facility earthquake-proofing reliability demonstration test.

As pertains to the light water reactor technology, using the Three Mile Island nuclear power plant accident of March last year as an example, it can be said that a turning point is about to be reached because more complete safety measures are being considered, the importance of quality guaranteed systems pertaining to design, manufacture and operation of nuclear power plants is recognized, studies on "how it should be" are zealously conducted, the importance of operational management and facilities management is stressed, the development of nuclear power generation support systems is in the process, etc.

Today when the development and introduction of an oil-replacing energy is an urgent matter, the hope on nuclear energy will increase hereafter, and when the solution is considered to be the above mentioned light water ractor which is predominant today, then efforts must be directed at perfecting light water reactor technology if this energy is to fulfill our hopes.

A review of the world's light water reactor manufacturers (Table 2) shows that Westinghouse and General Electric are overwhelmingly top ranking in technology and market shares. Combustion Engineering and Babcock and Wilcox are developing submarine-use nuclear reactors on the main body with an independent technique. Other representative light water reactor manufacturers are KWU of West Germany, FRAM·ATOM of France and ASEA-ATOM of Sweden, but the light water reactor technologies of KWU which developed a PWR independently both with WH's technology as base and ASEA-ATOM which developed a BWR independent of GE have drawn world recognition.

Table 2. Representative Light Water Reactor Manufacturers of the World

Name of Country	United States			
Name of manufacturer	GE	WH	CE	B&W
Reactor type	BWR	PWR	PWR	PWR
Orders fulfilled	62 units 61,320,000 KW	72 units 70,070,000 KW	31 units 33,230,000 KW	27 units 27,830,000 KW
Name of country	W. Germany	Sweden	France	
Name of manufacturer	KWU	ASEA·ATOM	FRAM·ATOM	
Reactor type	PWR, BWR	BWR	PWR	
Orders fulfilled	25 units 23,540,000 KW		38 units 39,450,000 KW	

Statistics on orders are as of late 1979

But the light water reactor manufacturers of the different nations, with the exception of France, have postponed their nuclear power construction plans, cancelled orders, etc., and are faced with difficulty in operations.

As to the FBR in Japan, the experimental reactor "Joyo" reached critically in 1977, construction of the prototype reactor "Monju" (300,000 KW) is imminent, the "Fast Neutron Engineering Co., Ltd." was established in April of this year with four manufacturers, and the FBR development structure is about to be organized. But until the FBR development structure is about to be organized. But until the state of practical application is reached with FBR, the prototype reactor must be followed up with the construction of a demonstration reactor of practical use size, followed by the construction of several units of early stage practical application reactors, and efforts must be directed for a smooth transition to practical application.

Table 3. FRB Development in the World

Name of Countries	Name of Reactors	Principal Developer	Order Placed By	Operator	Designer or Receiver of Order	Source of Capital
France	Prototype Phenix	CEA	CEA	EDA	CAAA	Total investment by the government CEA 80% EDF 20%
	Demonstration model Super-Phenix	CEA	International consortium NERSA	NERSA	Manufacturers' consortium NOVATOME (France) Manufacturers' consortium NIRA (Italy)	International joint investment EDF 51% ENEL 33% SBK 16%
Great Britain	Prototype PFR	UKAEA	UKAEA	UKAEA	NPC	Total investment by the government
West Germany	Protype SNR-300	Agency for 3 countries (West Germany, Belgium and Holland)	Electric power consortium of 3 countries SBK	SBK	Manufacturers' consortium INB	Government, electrical companies and other manufacturers
United States	Demonstration model CRBR	DOE	DOE	TVA	Principal contractor	Government, electrical companies and other manufacturers
Japan	Experimental model "Joyo"	Power Reactor and Nuclear Fuel Development Corp.	Power Reactor and Nuclear Fuel development Corp.	Power Reactor and Nuclear Fuel Development Corp.	Hitachi, Ltd., Toshiba Corp., Mitsubishi Heavy Industries, Ltd. and Fuji Electric Co., Ltd.	Total investment by the government

In the world today, France is the most advanced in FBR development (Table 3) and it is in the midst of constructing the 1.2 million KW demonstration reactor "Super-Phenix." Regarding nuclear reactors, it must be borne in mind that importing reactors intact that are developed abroad will involve many facets, such as the earthquakeproofing factor that may not necessarily be easy, and so efforts must be directed for an early and independent development of FBR.

After the shares of the government and private industries in the funds to construct the prototype reactor "Monju" are clearly delineated, the direction as to the development structure after the demonstration reactor following the "Monju" and on the subject of development, orders, raising construction funds, etc., must be resolved quickly and clearly.

Electronic Computer Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6, Jun 80 pp 36-45

[Article by the Electronic Apparatus and Electrical Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Progress of the Electronic Computer Industry

An electronic computer is an aggregate of system technologies that is realizable only after the development of advanced electronic and machinery engineering, and it is made with the most sophisticated electronic and machinery technologies of that era. The world's first electronic computer was made at Pennsylvania University by Eckert and Mauchly who developed the vacuum tube type ENIAC. In Japan, the University of Tokyo, the Electrotechnical Laboratory of MITI and the Electrical Communications Laboratory of the Nippon Telegraph and Telephone Public Corporation began development about 10 years after the United States.

Generally the development stages of the electronic computer are classified as generations depending on the type of element used in the electronic computer. (Table 1) The first generation was vacuum tube; the second generation, transistor; the third generation, integrated circuit (IC); the third and a half generation uses the LSI as element and the next generation will use an element made from microscopic processing, called VLSI. The computer has gradually become easy to operate with progress in the hardware along with the basic software or operating system of each generation. (Table 1)

The present state of the art is in the second half of the third and a half generation and the principal types are the IBM 370 series, the 303X; and the Japanese manufactured M-series, ACOS-series, COS MO-series, etc. The two types of the IBM 4300 series which were announced in January of last year are considered forerunners of the fourth generation and beyond doubt the transition into the fourth generation is imminent.

2. The Present State of the Electronic Computer Industry

The Japanese electronic computer industry has progressed satisfactorily and the production amount of apparatus related to the electronic computer industry has not only exceeded 1 trillion yen, but the number of general use electronic computers

Table 1. Electronic Computer Technology and Its Generations

Generations	Processing method	Hardware	Basic Software (Operating System)
First generation (up until 1960)	With assistance	Vacuum tube	Loader (Operate by reading machine address instructions) Assembler programming system (Translation of language through symbols by machine address instructions) FORTRAN programming system
Second generation (up until 1964)	Local batch processing	Transistor	Continuous processing of job (Translation of scientific language) ALGOL compiler (translation of business calculation language) COBOL compiler (Input/output control) IOCS
Third generation (up until 1970)	Multi-programming processing	IC	Multiple processing of job (Parallel processing of several jobs) Time sharing processing (Time sharing conversational type processing) PL/I compiler (Translation of general language) Data management (Control of diversified input/ouput apparatus)
Third and a half generation (the present)	Online processing	MSI-LSI	Job schedule management (Manage processing order of jobs) Online management (Control of diversified terminal apparatus) Virtual memory management (Technology to make large program executable over that of true memory)
Fourth generation (the future)	Composite distributed processing by user's directions	VLSI	RASIS function (Guarantees confirmation of system movements) Virtual machine function (Virtual calculator function) Network management (Exchange of voluminous data between several systems) Processing characters, graphic symbols, images and the Japanese language (from data processing to information processing) Function to process super advanced language (Anyone can use the computer for advanced purposes)

in actual operation (Figure 1) is 61,687, as of late June 1979, making Japan second ranking in the world.

On export and import trends (Figure 2), exports at the end of 1979 totalled 80.9 billion yen and imports 154.3 billion yen, showing a continued unfavorable trade balance, and the year 1979 (sic) will result in a bigger deficit. But since a part of the exports consists of products manufactured by foreign-affiliated corporations, exports by domestic electronic computer manufacturers are about to be increased, by the amount is still small.

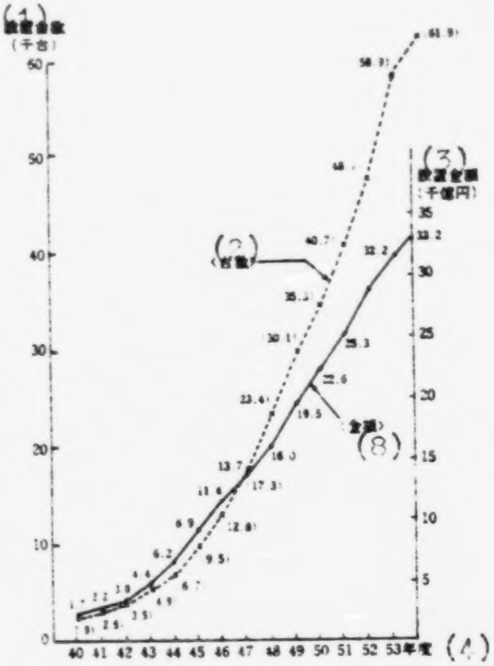


Figure 1. Status of General Use Electronic Computers in Actual Operation

Source: MITI's "Survey on Goods Delivered"
As of late June 1979: Value: 3,315,982 million yen
Units installed: 61,687 units total value

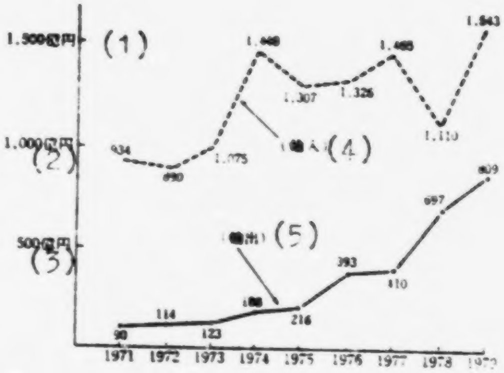


Figure 2. Computer Exports and Imports

Source: Finance Ministry's Customs Statistics

Key:
(1) 150 billion yen
(2) 100 billion yen
(3) 50 billion yen
(4) Imports
(5) Exports

As described above, the electronic computer manufacturers are about to make a start on the fourth generation and IBM has already announced three types of medium and small size computers of the so-called E-series. Moreover, it is reported that IBM is scheduled to announce the H-series of large-size computers. In answer to this, other foreign-affiliated corporations have successively announced computer types to compete against the E-series and therefore domestic manufacturers are rushing to develop competitive types.

Table 2. Programs to Promote the Information Industry

				(Budget for FY 1979)	(Budget planned for FY 1980)
To promote the information industry	To promote hardware	1.	Subsidies to accelerate the development of an electronic computer with the next generation	(8.61 billion yen)	(5.785 billion yen)
		2.	Development Bank loan to the Japan Electronic Computer Co., Ltd.	(within 50 billion yen)	(within 48 billion yen)
		3.	Development Bank loan for structural improvement	(within 50 billion yen)	(within 48 billion yen)
		4.	Special redemption fund for high performance electronic information remote processing apparatus	-	-
	To promote software	1.	Software production technological development plan	(1.52 billion yen)	(1.67 billion yen)
		2.	Subsidies for operational expenses of The Council for the Promotion of Information Processing (includes above 10)	(2.58 billion yen)	(2.78 billion yen)
		3.	Financial measure for information processing promotion (underwrite bank debenture)	(7 billion yen)	(5 billion yen)
		4.	Development Bank loan to nurture technicians for software development and information processing	(within 50 billion yen)	(within 48 billion yen)
		5.	Reserve fund system [illegible] general-use software development	-	-
		6.	Reserve fund system for program guarantee	-	-
To accelerate use of information	To advance systems development	1.	Development of pattern information processing system (large-scale project of the Agency of Industrial Science and Technology)	(2.8 billion yen)	(1.846 billion yen)
		2.	Development of a health care network system	(100 million yen)	(220 million yen)
		3.	Development of a substitute energy type community energy system	(9 million yen)	(42 million yen)
		4.	Development of a trade information system	(25 million yen)	(34 million yen)
		5.	Development Bank loan to accelerate usage of information processing system	(within 50 billion yen)	(within 48 billion yen)
	Basic preparation to use of information	1.	Survey on the actual state of information processing	(16 million yen)	(16 million yen)
		2.	Survey on statistics of electronic computer orders fulfilled	(5 million yen)	(5 million yen)
		3.	Survey on industries by classification converting to systems	(2 million yen)	(2 million yen)
		4.	Survey on legal protection of software	(6 million yen)	(6 million yen)
		5.	Program survey record	(2 million yen)	(2 million yen)
		6.	Information processing technicians' exam	(62 million yen)	(68 million yen)
		7.	Comprehensive survey on problems of information processing technicians	(2 million yen)	(2 million yen)

[Table 2 continued]

8. System to reduce taxes from educational and research expenses for information processing technology		
9. Safety measures for the information processing services	(0 million yen)	(2 million yen)
10. Safety measures for software, etc.	(700,000 yen)	(700,000 yen)
11. Loan system to accelerate safety measures for the electronic computer system (Development Bank) (medium and small financial institutions)	(within 50 billion yen for Development Bank) (3 billion yen for medium and small financial institutions)	(within 48 billion yen for Development Bank) (3 billion yen for medium and small financial institutions)
12. Register system for the information processing service business	(1 million yen)	(1 million yen)
13. Information changeover week	(400,000 yen)	(400,000 yen)
14. Subsidies to introduce electronic computers to Chambers of Commerce and others	(127 million yen)	(190 million yen)

3. Promotional Measures of the Electronic Computer Industry

Because the electronic computer industry, besides being an extremely advanced and knowledge-intensive industry, can bring about the increase of productivity in manufacturing and business of other industries through the use of electronic computers, it is an industry that can contribute to the advancement of Japan's industrial structure. Moreover, because the technologically rippling effect of the electronic and machinery industries, information processing industry, etc., is enormous, and because it can contribute to nurture new industries such as the data base industry, systems industry, etc., this industry can become Japan's leading industry in the 1980's. To achieve this and in order to facilitate the advancement of the electronic computer industry, the government adopted various measures, as shown on Table 2, to promote information processing.

The program on subsidies for expenses to advance the next generation electronic computer development is to promote technological development need for the fourth generation electronic computer and assistance has been given to private interests to conduct technological development on VLSI and basic technologies.

The VLSI development project was a 4-year plan, beginning in FY 1976, and development was undertaken at the VLSI Technology Research Association which developed a technology of submicron processing as pertains to (1) microscopic process technology, (2) crystal technology, (3) design technology, (4) process technology, (5) test evaluation technology and (6) device technology. The subsidy program was concluded at the end of March 1979.

One of the results achieved by this VLSI development project is the 256 K bit RAM which was announced at the ISSCC held recently in San Francisco. (A portion of the results was presented in "This mouth's photograph" in the May 1980 issue of this magazine.) Hereafter, with the 4-year results as basis, the various companies will independently develop electronic computers packaged with VLSI.

The development of basic technology for the next generation electronic computer program was launched as a 5-year plan from FY 1979 with a total operating outlay of 47 billion yen to technologically develop a new peripheral terminal apparatus that would handle the Japanese language and basic software called operating systems. The technological development will be undertaken by the Electronic Computer Basic Technology Research Association which consists of Japan's computer and peripheral terminal manufacturers. The contents of the technology development are as follows:

(1) Basic Software

(i) Control program

(1) Basic technology

Basic technology is the development of such technology as one level storage management that would make the main storage and secondary storage uniformly accessible, a capability to prevent, detect and quickly recover abnormal movements of the electronic computer system, RASIS function to strengthen and perfect the secrets protection capability, and a resource sharing system to devise the effective use of the various resources. (Figure 3)

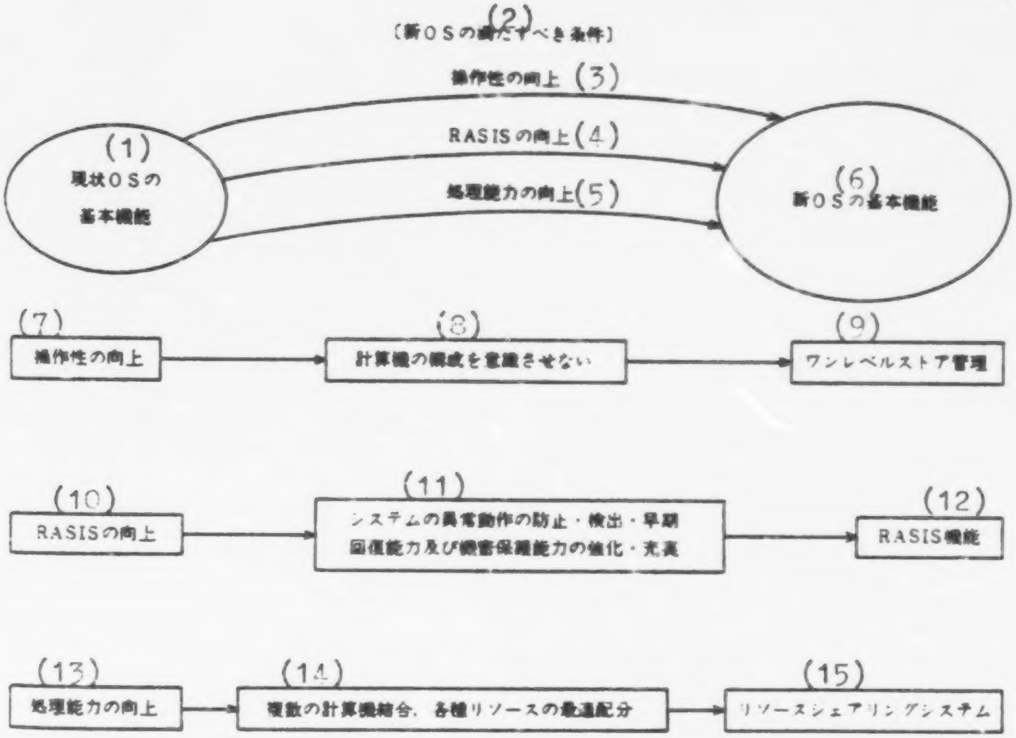

(2)
〔新ＯＳの満たすべき条件〕
操作性の向上 (3)
RASISの向上 (4)
処理能力の向上 (5)
(1)
現状ＯＳの
基本機能
(6)
新ＯＳの基本機能
(7)
操作性の向上
(8)
計算機の構成を意識させない
(9)
ワンレベルストア管理
(10)
RASISの向上
(11)
システムの異常動作の防止・検出・早期
回復能力及び機密保護能力の強化・充実
(12)
RASIS機能
(13)
処理能力の向上
(14)
複数の計算機結合、各種リソースの最適配分
(15)
リソースシェアリングシステム

Figure 3. Basic Technology

Key:
(1) Basic functions of present day operating system
(2) Conditions that must be fulfilled by the new operating system
(3) Upgrading manageability
(4) Upgrading RASIS
(5) Upgrading processing capability
(6) Basic functions of new operating system
(7) Upgrading manageability
(8) Composition of the computer is deliberately avoided
(9) One level storage management
(10) Upgrading of RASIS
(11) Strengthen and complete the capability for prevention, detection and early recovery of abnormal movements of the system and the capability for security maintenance
(12) RASIS functions
(13) Upgrading of processing capability
(14) Linkage of several computers and the ideal distribution of various resources
(15) Resource sharing system

(2) Network management technology

Since it is essential to have a sophisticated electronic computer network to go along with the technological innovation of a data communications network, develop an operating system alongside the computer to realize a network management technology so as to plan for the effective use of the system sources, etc. (Figure 4)

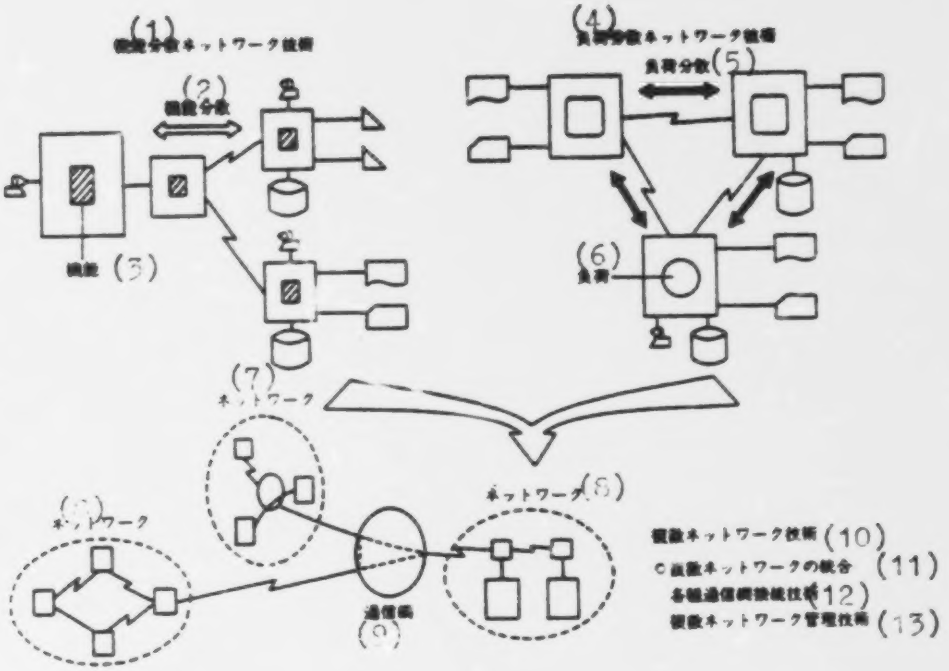
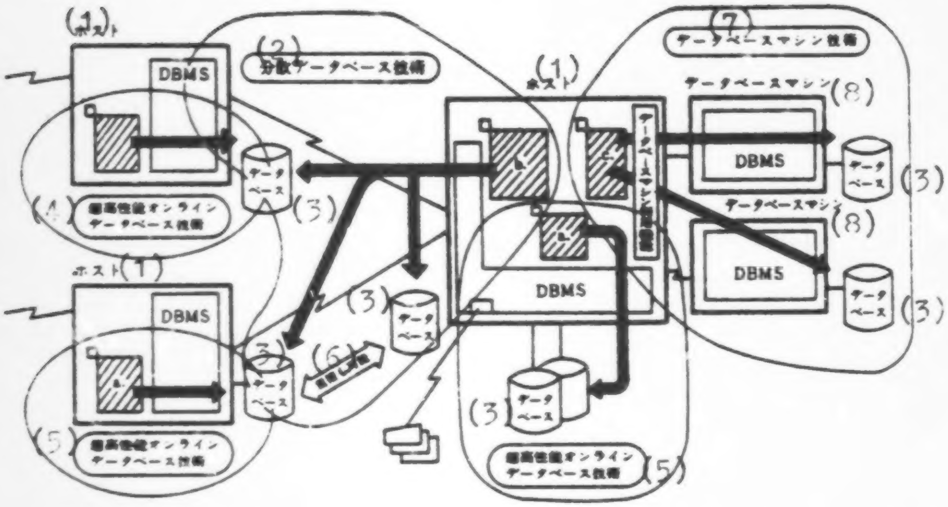

(1)
機能分散ネットワーク技術
(2)
機能分散
機能 (3)
(4)
負荷分散ネットワーク技術
負荷分散(5)
(6)
負荷
(7)
ネットワーク
ネットワーク(8)
ネットワーク
通信網
(9)
複数ネットワーク技術 (10)
○複数ネットワークの統合 (11)
各種通信網接続技術 (12)
複数ネットワーク管理技術 (13)

Figure 4. Scheme of Network Technology

Key:
(1) Network technology of distributed function
(2) Distributed function
(3) Function
(4) Network technology of load distribution
(5) Load distribution
(6) Load
(7) Network
(8) Network
(9) Communication network
(10) Multiple network technology
(11) Integration of multiple network technology
(12) Technology to connect several communications networks
(13) Multiple network management technology

(3) Data base management technology

Develop a data base management technology that would increase the efficiency level of data base processing so as to cope with an enlarged capacity of the data base and sectional decentralization. (Figure 5)


(1) ホスト
DBMS
(2) 分散データベース技術
(1) ホスト
(7) データベースマシン技術
データベースマシン (8)
DBMS
データベース (3)
(4) 超高性能オンラインデータベース技術
(3)
データベースマシン (8)
DBMS
(3)
ホスト (1)
DBMS
(3)
DBMS
(3)
(6) 重複も可能
(3)
(5) 超高性能オンラインデータベース技術
超高性能オンラインデータベース技術 (5)

Oblique lines indicate applications programs. a. using very high performance online data base technology, b. using distributed data base and c. application program using data base machine technology

Figure 5. A Comparison of Data Base Technology, Very High Performance Online Data Base Technology and Distributed Data Base Technology

Key:
(1) Host
(2) Distributed data base technology
(3) Data base
(4) Very high performance online data base technology
(5) Very high performance online data base technology
(6) Overlapping is possible
(7) Data base machine technology
(8) Data base machine

(4) Virtual Machine Technology

In order to make the user's varied applications available, develop a virtual machine technology that would result in several units of virtual computers with one unit of an electronic computer system as basis. (Figure 6).

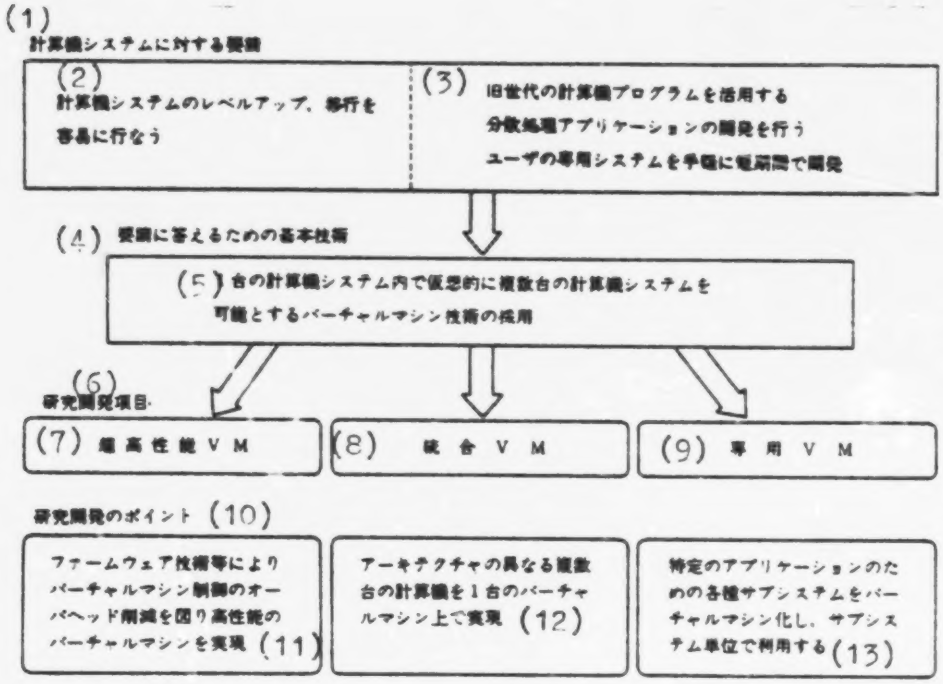

(1)
計算機システムに対する要請
(2)
計算機システムのレベルアップ、移行を容易に行なう
(3)
旧世代の計算機プログラムを活用する
分散処理アプリケーションの開発を行う
ユーザの専用システムを手軽に短期間で開発
(4) 要請に答えるための基本技術
(5) 台の計算機システム内で仮想的に複数台の計算機システムを可能とするバーチャルマシン技術の採用
(6)
研究開発項目
(7) 超高性能VM
(8) 統合VM
(9) 専用VM
研究開発のポイント (10)
ファームウェア技術等によりバーチャルマシン制御のオーバヘッド削減を図り高性能のバーチャルマシンを実現 (11)
アーキテクチャの異なる複数台の計算機を1台のバーチャルマシン上で実現 (12)
特定のアプリケーションのための各種サブシステムをバーチャルマシン化し、サブシステム単位で利用する (13)

Figure 6. Virtual Machine Technology

Key:
(1) Requirements of a Computer System
(2) Raise the standard of the computer system with smoother movements
(3) Apply the computer program of the previous generation
Develop distributed processing applications
Develop the user's special system readily in a short time
(4) Basic technology to meet requirements
(5) Utilize a virtual machine technology that would make it possible for multiple units of a computer system to be virtually used within one unit of a computer system.
(6) Topics for research and development
(7) Very high performance V M
(8) Integrated V M
(9) Specialized V M
(10) Essentials of research and development
(11) Achieve high performance virtual machining by contriving for overhead reduction with virtual machine control through (formware) technology, etc.
(12) Make it possible for multiple units of a computer with a different architecture placed over one unit of virtual machine
(13) Use subsystem units by virtual machine conversion of various subsystems for specialized application

(ii) Super class language processing

(1) Super class language processor

Along with the accelerated popularity of electronic computers, the end user's demand for an application program development has increased. To cope with this demand, develop a super class language processor that would be used as a tool to assist the end user's work. (Figure 7)

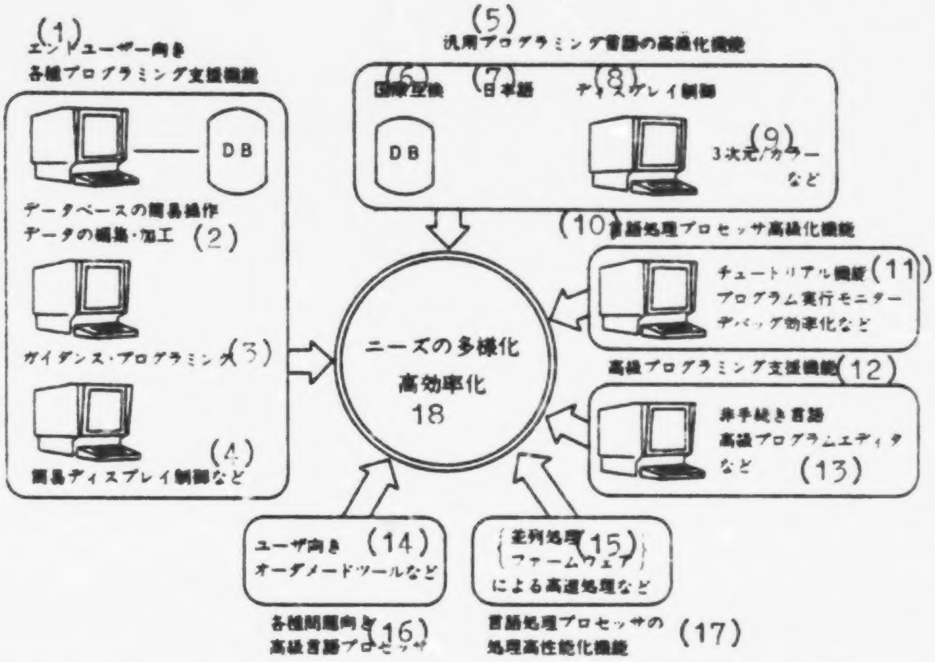

(1)
エンドユーザー向き
各種プログラミング支援機能
DB
データベースの簡易操作
データの編集·加工 (2)
ガイダンス·プログラミング (3)
(4)
簡易ディスプレイ制御など
(5)
汎用プログラミング言語の高級化機能
(6) 国際交換
(7) 日本語
(8) ディスプレイ制御
DB
(9)
3次元/カラー
など
(10) 言語処理プロセッサ高級化機能
チュートリアル機能 (11)
プログラム実行モニター
デバッグ効率化など
高級プログラミング支援機能 (12)
非手続き言語
高級プログラムエディタ
など (13)
ニーズの多様化
高効率化
18
ユーザ向き (14)
オーダメードツールなど
並列処理
ファームウェア (15)
による高速処理など
各種問題向き (16)
高級言語プロセッサ
言語処理プロセッサの
処理高性能化機能 (17)

Figure 7. Language processor

Key: (1) Made for the end user; support function for various programs
(2) Simple manipulation of data base; data editing and processing
(3) Guidance programming
(4) Simple display control, etc.
(5) Function to upgrade general use programming language
(6) International interchange
(7) Japanese language
(8) Display control
(9) Three dimensional/color, etc.
(10) Function to upgrade language processor
(11) Tutorial function; program executing monitor; debug efficiency conversion, etc.
(12) Higher level programming support function
(13) Non-procedural language; higher level program editor, etc.
(14) Made for the user; custom made tools, etc.
(15) Parallel processing; (formware); based on high speec processing, etc.
(16) Made to solve various problems; higher level language processor
(17) Function to upgrade high performance of language processors
(18) Diversification of needs; upgrading to higher efficiency

(2) Japanese language information processing technology

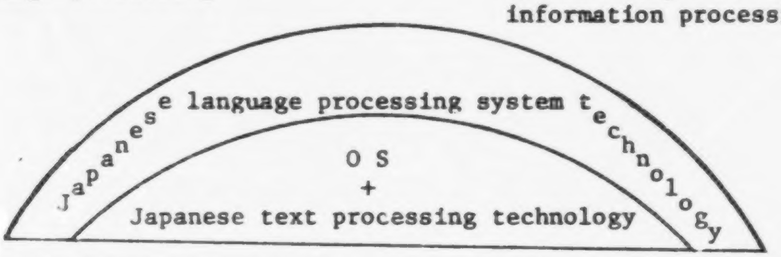
Develop a Japanese language information processing technology to install a standard function of the operating system having the basic function to process Japanese text, and to develop a Japanese language processing systems technology with which to develop a pilot plant for Japanese language information processing. (Figures 8 and 9).

(2) New Peripheral Terminal Technology

(i) Japanese language input-output technology

To develop a kana, Chinese charter input apparatus technology that would convert kana inputs automatically into Chinese characters as an input-output (I/O) technology with direct access to the Japanese language, a Japanese language voice input apparatus technology that would have a direct voice input, a Chinese character OCR that would make inputs of written Chinese characters possible, and a Japanese language printer technology for Japanese text at super speed, high quality and with multi-functions.

Technology topics	Japanese text processing technology	Japanese language processing system technology
Technology of software on subject matter	Software technology to incorporate the standard functions of the operating system for Japanese language processing	A system technology that is essential for a pilot system and software in order to disseminate Japanese language information processing


Japanese language processing system technology
O S
+
Japanese text processing technology

Substantive content	o Chinese character basic processing technology o Technology to control Japanese language input-output apparatus o Technology to change kana and Chinese character sentences from the host side of the operating system o Technology to manage the Japanese language file o Technology to edit Japanese language text	o Japanese language information processing, Data base management technology o An integrated editor technology to include graphics and Japanese language sentences o Office automation technology o Pilot system

Figure 8. Japanese Language Information Processing Technology

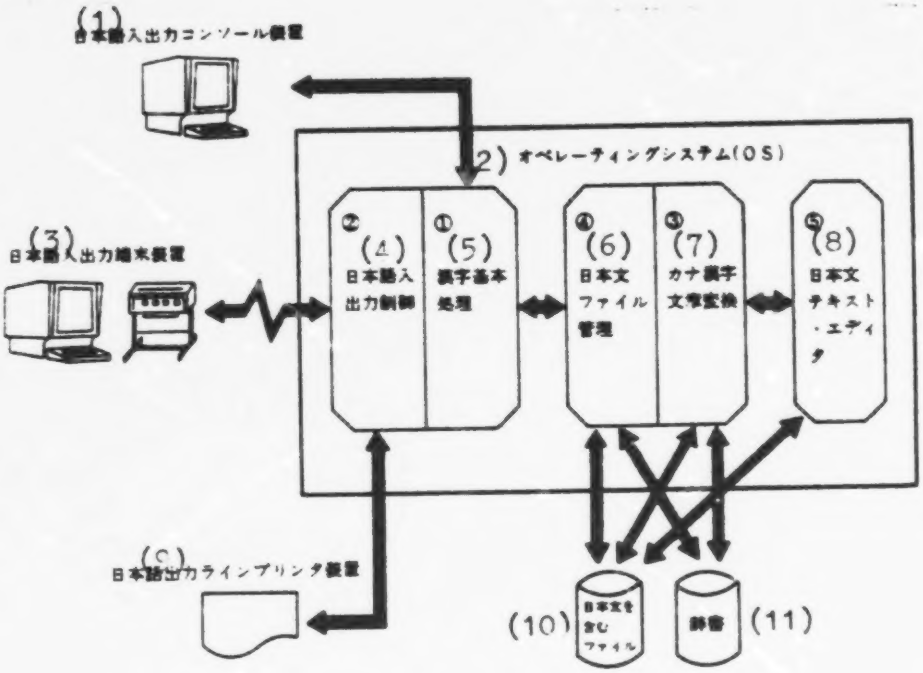

(1)
日本語入出力コンソール装置
2) オペレーティングシステム(OS)
(3)
日本語入出力端末装置
②
(4)
日本語入出力制御
①
(5)
漢字基本処理
④
(6)
日本文ファイル管理
③
(7)
カナ漢字文字変換
⑤
(8)
日本文テキスト・エディタ
(9)
日本語出力ラインプリンタ装置
(10)
日本文を含むファイル
辞書
(11)

Figure 9. Japanese Text Processing Technology

Key: (1) Console apparatus for Japanese language input/output
(2) Operating system
(3) Japanese language input/output terminal apparatus
(4) Japanese language input/output control
(5) Chinese character basic processing
(6) Japanese text file management
(7) Conversion of kana and Chinese character sentences
(8) Japanese text editor
(9) Japanese language output line printing apparatus
(10) File which includes Japanese text
(11) Dictionary

(ii) Japanese language external storage technology

Develop a super large capacity and super high speed magnetic disk apparatus technology and a large capacity magnetic bubble apparatus technology for inputs of Japanese text.

4. Development of Electronic Computer Technology

(1) New Device Technology

Any change in the generation of an electronic computer system is dependent on device technology. Research on new devices requires that, from the standpoint of the element, research on the basic element material and on the technology to functionalize the results of the element, and from the standpoint of devices, research on the functional module as an extension of the functionalizing technology must be undertaken.

As for the silicon element which is the mainstay today, the research and development expenses that must be paid for upgrading its performance in the research and development stage has increased index and functionwise and with the progress in VLSI, its physical limitations can be foreseen. Therefore, as the logical element and memory cell to be used on future electronic computers, research on new element materials of high speed and high density must be undertaken.

(i) GaAs Semiconductor Element

Since the mobility of the conductive electric charge of most of the compound semiconductors is greater than that of silicon, it is possible that their electrical characteristic is superior than that of silicon. The semiconductor with advanced development today is GaAs which is a field effect transistor using the (metaru) Schottky gates whose high speed rate has been recognized. Special features of GaAs element are as follows: (1) Its electronic mobility of 4000 cm^3/Vsec is greater than the 1000 cm^3/Vsec for silicon, (2) the distributing capacity is low because of the distributing possibility on the semi-insulating plate, (3) the possibility for high speed motion exists because separation between elements is possible and (4) its simple structure and separation factor make it suited for high integration. It is reported in the United States that a 10-20 gate unit has a computing speed of 100 to 300 psec, power consumption of 200 to 3,000 μw/gate, and in particular a high speed unit of about 50 psec.

But because of the paucity of research data accumulated in the past, on GaAs element, as compared with silicon, research activity on a wider scale must be conducted, e.g. on materials technology: base plate improvement technology, epitaxial technology, impurities control technology, ion implementation, and hetero-epitaxial technology; on materials evaluation technology: technology to evaluate semiconductor base plate epitaxial interface, etc.; on device manufacturing technology: Schottky type FET manufacturing technology, microscopic processing technology, insulating membrane preparation technology and (various growth) preparation technology; on integration-conversion technology: integration technology, circuit structure technology and design technology and design technology. Anticipated characteristics when it will be used as the logical element of an electronic computer are:

a. gate count: 200 to 1,000

b. computing speed: 50 to 100 psec

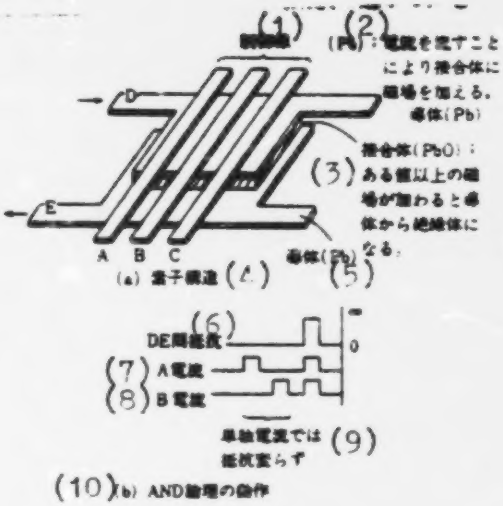
c. power consumption: 10 to 1,000 mW/chip

As for packaging, if the convertibility of the silicon bipolar element, as used in the past, can be guaranteed, the use of GaAs in the system is close by.

(ii) Josephson element

Because the switching feature of the Josephson element is exceptionally superior, the prospects are bright that it will be used in the construction of the electronic computer of the future. (Figure 10)

Figure 10. Josephson's Logical Element


(1) 制御線
(2) (Pb)：電流を流すことにより接合体に磁場を加える。
導体(Pb)
接合体(PbO)：ある値以上の磁場が加わると導体から絶縁体になる。 (3)
D
E
A B C
(a) 素子構造 (4)
導体(Pb) (5)
(6) DE間抵抗
0
(7) A電流
(8) B電流
単独電流では抵抗変らず (9)
(10) (b) AND論理の動作

Key:
- (1) Control lines
- (2) An electric flow creates a magnetic field over the connector. Conductor (Pb)
- (3) Connector (PbO) If the magnetic field exceeds a certain value, then the conductor becomes insulated
- (4) Structure of element
- (5) Conductor
- (6) Resistance between DE
- (7) A current
- (8) B current
- (9) Resistance will not change with an independent current
- (10) Movement of AND logic

Some of its outstanding features are: (1) The speed of the on/off movement of the connector is 1 o r 2 digits faster than that of the semiconductor element, (2) power consumption is 1 to 3 digits less than that of a semiconductor because of its superconductive element, (3) it is suited for high integration because of its simple structure, (4) will not move unless it is at low temperature. These outstanding features are epoch making when compared with the semiconductors used heretofore. And because it can be used both as a logical element and a memory element, it is possible to construct an electronic computer with only the Josephson element.

IBM is engaged vigorously in research on the Josephson element by developing a unit with a gate count of 10 to 50, computing speed of 50 to 500 psec and power consumption of about 10μW/gate. Even in Japan, several firms have begun research from FY 1980 with research and development subsidies on essential technologies.

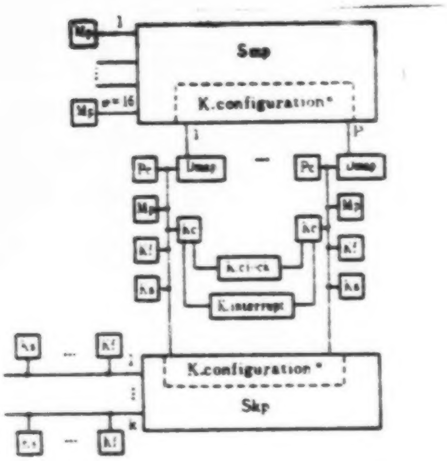
Before achieving practical utilization of this element, research and development on a considerably wide scale, from fundamentals to application, must be undertaken.

(1) Materials technology: Develop an element having a high critical temperature, using the Josephson element.

(2) Manufacturing technology: Technology to manufacture a binder (connector) with a recall feature and an element structure that can withstand a temperature cycle.

(3) Design technology: Design technology most suited for an element; circuit structure technology; technology linked with normal temperature conditions and packaging technology as a sytem.

(4) Refrigeration technology: Low temperature technology with high efficiency.


Mp
1
Smp
Mp
p=16
K.configuration*
1
P
Pc
Dmap
Pc
Dmap
Mp
Mp
Kc
Kc
Kf
Kf
K.clock
Ks
Ks
K.interrupt
Ks
Kf
1
K.configuration*
Skp
Ks
Kf
k

Pc: processor; Ks: low speed device control Dmap: address conversion
Mp: main memory; Kf: high speed device control; Smp: switches
T : Terminal; Kc: control by clock, etc.; K.configuration: configuration control
K.clock: clock control
* Both switches are manual; program control is possible; K.interrupt: interruption control

Figure 11. Schematic of C.mmp System

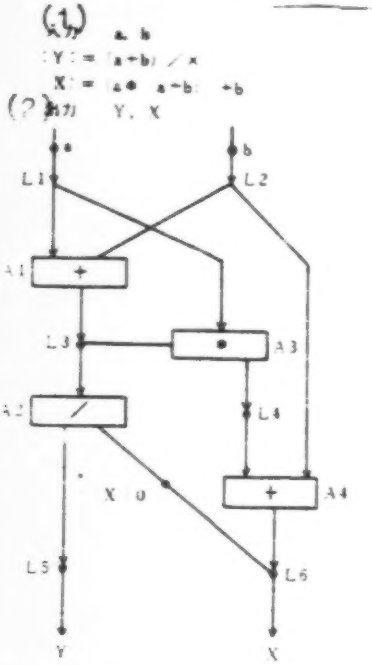

(1) 入力 a, b
Y := (a+b)/x
X := (a*(a+b))+b
(2) 出力 Y, X
a
b
L1
L2
A1
+
L3
*
A3
A2
/
L4
X≠0
+
A4
L5
L6
Y
X

Figure 12. Fundamental Data Flow Program

Key: (1) input
(2) output

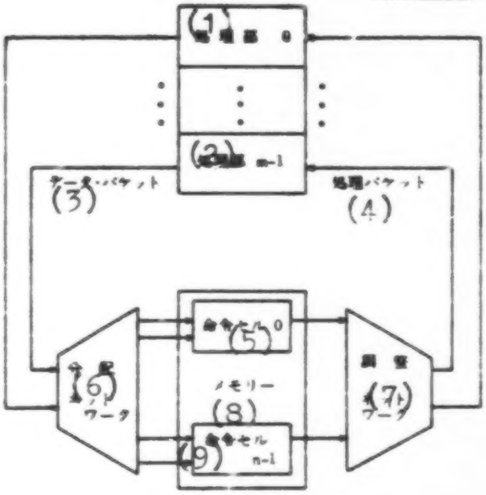

(1) 処理部 0
(2) 処理部 n-1
(3) データ・パケット
(4) 処理パケット
(5) 命令セル 0
(6) 分配ネットワーク
(7) 調整ネットワーク
(8) メモリー
(9) 命令セル n-1

Figure 13. Basic Schematic of Data Flow processor

Key: (1) processing section
(2) processing section
(3) data bucket
(4) processing bucket
(5) instruction cell
(6) distribution network
(7) regulation network
(8) memory
(9) instruction cell

Many problems must be solved to realize this sort of practical application, but it is felt that on attaining practical application, its performance will render the electronic computer with epoch making improvements. Such making improvements. Such an element will possess the following characteristics:

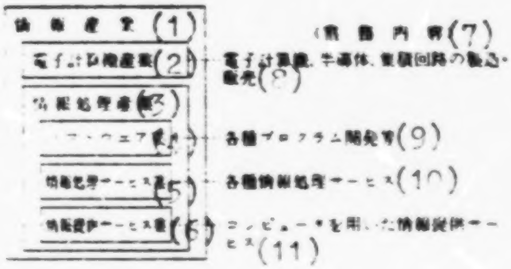
a. gate count: 100 to 1,000

b. computing speed: 10 to 100 psec

c. power consumption: 0.1 to 100 mW/chip

d. memory count: more than 10^9 bit

e. access time: less than 10 nsec



(2) New Architecture

Since the processing efficiency of electronic computers that were based on sequential processing heretofore was had and so as to cope with the demands of information processing that will increasingly have multifarious uses hereafter, research must be conducted on processing apparatus that will have a high efficiency for adaptation to various applications. This type of new processing apparatus indicates the realization of the so-called non (noiman) function, of a processing apparatus and large capacity data base which use a parallel processing apparatus, data flow processing apparatus, associative processing apparatus, list processing apparatus, and learning and reasoning functions.

(1) Parallel processing apparatus

Like the multiprocessor system of consolidating several electronic computers to process data with independent operational units, the famous C.mmp system of 16 minicomputers consolidated with crossbar switch is used. (Figure 11). Two types of development with differing objectives on parallel processing apparatus are undertaken. The first, focused on large scale scientification with the partial differential equation, is to develop a very high performance parallel processing apparatus which centers on numerical processing that would contribute to the progress of practical application involving a great deal of computing. Fluid mechanics, structural computation, nuclear power engineering are some of the disciplines with high requirements for parallel processing apparatus. The other type is to develop a parallel processing apparatus for non-numeric processing that would contribute to the expansion of application in graphics and image processing.

As a condition to the effectiveness of parallel processing, software must be developed for high speed logic, high speed memory element, processing descriptive language, automatic search for parallel processing, algorithm suited for parallel processing, etc.

(ii) Data flow processing apparatus

The data flow processing apparatus is an electronic computer than basically has a program structure that is data oriented with architecture and it has considerable differences with the (fon noiman) type computer which is program oriented or the control oriented type used heretofore. (Figures 12 and 13) The principal characteristics are: (1) The emphasis on the (fon noiman) computer is flow of control and data operation is based on this flow, but with the data flow processing apparatus, the emphasis is on flow of data and processing is done while the data is operated on. (2) In data flow processing, the flow of data that can be parallel processed is recorded and processed by means of the parallel processing structure. (3) The operational units have different levels, ranging from such basic operations as the arithmetical (add, subtract, multiply and divide) to such high functions as the functional operations. Such classifications as large scale scientific computation, signal processing, graphics and image processing have taken advantage of these characteristics in application. The program is easy to prepare if the operating units are established on a high functional level, thereby raising its program productivity. With past program languages, there are such advantages as only complex descriptions could be made and at the same time parallel movements in natural description can be described.

Research on data flow processing apparatus is actively conducted in the United States, Great Britain and France, principally at universities and well known are Massachusetts Institute of Technology, University of California and Burroughs at the Utah University. However, at the present time it is difficult to predict the role of the data flow processing apparatus in the information processing system of the future, and hereafter to develop a data flow apparatus, the main objective should be to develop a data flow processing apparatus for the primary purpose of supplementing the general purpose computer for a specific application, and it is hoped that studies will be made on the convertibility and switchover of general purpose units or programs used heretofore.

5. The Future of the Electronic Computer Industry

With the announcement of the 4300 series (E series) by IBM, the electronic computer is at the threshold of utilizing the fourth generation element. It is reported that the announcement of the H series, which is the higher grade in the E series, will be made this year and next year, and said announcement will herald the formal entry of the fourth generation into electronic computer use.

And with the announcement possibly as early as 1983 of electronic computers equipped with the fourth generation element to be derived from VLSI development and other basic technology development, Japan's electronic computer industry will reach a new turning point in the very near future. Despite these new developments, Japan's electronic computer industry heretofore had grown by adding on to past performances, but in order to achieve higher level upgrading of Japan's industrial structure, untiring efforts in technological development must be exerted hereafter.

Information Processing Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6 Jun 80 pp 46-51

[Article by the Information Processing Promotion Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Development Stages of the Information Processing Industry

(1) The Role of the Information Processing Industry

The information processing industry is divided into the following three parts:

(1) Software service: Prepares programs for use with the electronic computer, on request by others.

(2) Information processing service: Processes information through computation by means of the electronic computer, on request by others.

(3) Information furnishing service: Retrieves and furnishes information by means of the electronic computer, on request by others.

It is the ideal industry for being knowledge-intensive, resource-conserving, energy-saving and non-polluting, and as the nucleus for the highly advanced development of Japan's industrial structure, its growth as an industry is greatly anticipated. (Figure 1)

Information industry	Business functions
Electronic computer industry---------	Manufacture and sale of electronic computers, semiconductors and IC
Information processing industry	
Software services--------------------	Development of various programs
Information processing services------	Various information processing services
Information furnishing services------	Information furnishing services utilizing computers

Figure 1. The Role of the Information Processing Industry

(2) History of the Information Processing Industry

Japan's information processing industry was begun in the second half of the 1950's and since then along with the progress in society's acceptance of information usage, it has consistently achieved rapid growth. (Figure 2). Furthermore, with the sudden technological innovation of the information processing technology, its business scope has undergone drastic transformation.

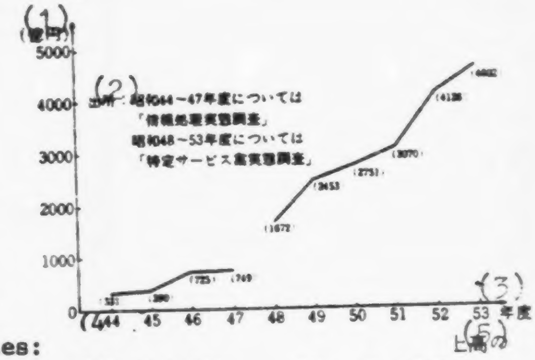


Figure 2. Progress in Sales of Japan's Information Service Industry

Key: (1) unit value=100 million yen
(2) Source: Statistics from 1969 to 1972 were obtained from the "Survey on the Actual State of Information Processing"
Statistics from 1972 to 1978 were obtained from the "Survey on the Actual State of Exceptional Services:
(3) Showa year designation
(4) 44=1969
(5) 53=1978

The development stages of the information processing industry up to now can be shown in periods of 5 years each and a summary of each period is given as follows:

(1) Second half of the 1950's (birth of the information processing service)

It is said that Japan's first computer center was established in 1954. Reportedly 24 computer centers were established between 1954 and 1961, an average of three centers per year.

This is the period when the industrial world began to make progress by leaps and bounds, after the period of confusion in the post-war years, and along with the increase in the workload from the growth of the operational structure, rationalization of operations became evident; then the electronic computer became the new office equipment to replace the abacus, but because business matters were mostly processed in-house, it can be said that the role of the computer center was wholly to serve as an auxiliary function to the electronic computer user.

On the other hand, the bulk of the supply of software, which is indispensable with the use of an electronic computer, was furnished by the computer hardware supplier (dealer of foreign-made computers and domestic manufacturer) at the time of purchase as an ancillary service, which in most cases was free of charge, and so the business of software production and marketing could not become an independent industry.

(2) First half of the 1960's (birth of the software services)

During the first half of the 1960's, computers with the second generation element were used in a business course on transistors, and the popularization of computers catering to big business was begun with the establishment of the Japan Electronic ComputerCo. in 1961 to serve as a centralized rental agency of domestic manufactured computers. This period flourished with the introduction of scientific operational management techniques on business operations, and with computer adaptation in multifarious ways, such as mechanization of office matters, production management and technology development, the demand for information processing expanded. Along with the growth in computer use and expansion of its adaptations, the demand for information processing increased tremendously; with the gradual high level advancement and specialization of information processing technology, an environment that made it possible for the information processing service to exist as an industry was formed, and the number of computer centers established was of an annual average of about 30 and a total of 145 computer centers was established by 1965. This can be considered to be the era of growth of the information processing service industry.

With the growth in computer use and expansion of its adaptations, the computer users and information processing service personnel could not respond to the needs of information processing over a widely varied field with only the stereotyped processing pattern of software furnished without charge by the computer hardware companies. Then with some dissemination of knowledge and techniques (general purpose language) necessary for software production, the computer users and information processing service personnel gradually became organized to have their key personnel compile their own software, and some of them became organized to specialize in software production and to gain expert knowledge in a specialized processing field, and finally a group engaged in software conversion formed an independent business, the birth of the software houses. (Figure 3)

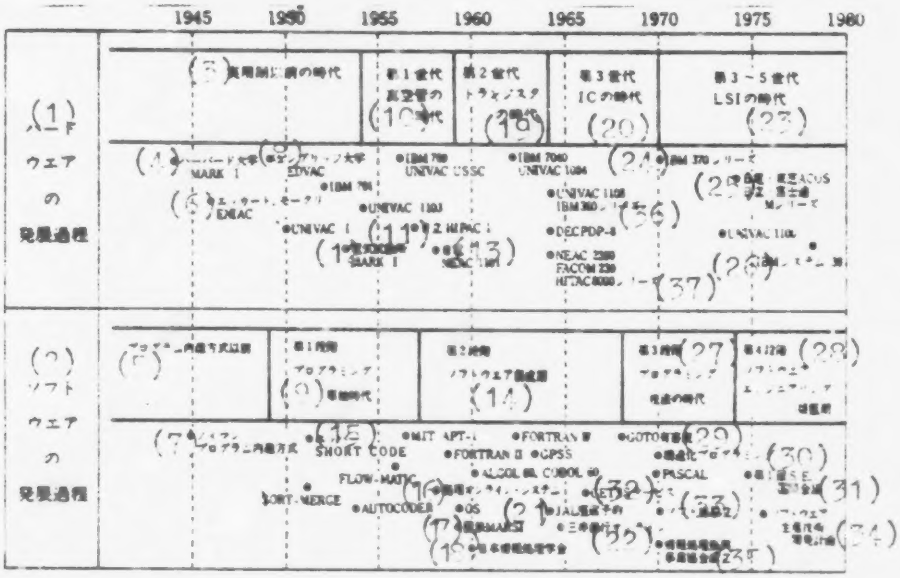


Figure 3. The Development Stages of Hardware and Software (The Present State and Outlook of Software)

Key:
(1) Development stages of hardware
(2) Development stages of software
(3) The era before practical application
(4) Harvard University
(5) Before usage of the stored program
(6) Eckert and Mauchly
(7) (Noiman) Stored program
(8) Cambridge University
(9) First stage; programming; elemental stage
(10) First generation; era of the vacuum tube
(11) Hitachi
(12) Electrotechnical Laboratory
(13) Nippon Electric Co., Ltd.
(14) Second stage: origin of software
(15) (Hoppa)
(16) Commercial use online system
(17) National Railways
(18) Information Processing Society of Japan
(19) Second generation; era of the transistor
(20) Third generation; era of the integrated circuit
(21) Seating reservation of the Japan Air Lines
(22) Online for Mitsui Bank
(23) Third to fifth generation; era of the LSI
(24) IBM 370 series
(25) Nippon Electric Co., Ltd., Toshiba ACOS, Hitachi, Ltd. and Fujitsu Ltd., M series
(26) IBM system /38
(27) Third stage: Programming; era of techniques
(28) Fourth stage: Software engineering; infancy stage
(29) Goto's theory on detriment
(30) Programming with structural changes
(31) First international conference on software engineering
(32) GETSS service
(33) Software Association established
(34) Plan to develop software production technology
(35) Establishment of information processing and furnishing services association

(3) Second half of the 1960's (Period of development)

In entering the second half of the 1960's, the computer prices were lowered with the conversion to the IC element and with the series system, the different types rendered a wider sphere of use. Computer utilization in business was expanded to include such areas as mass production, process management for mass sales, warehousing management, sales management and technology development, and the use of the computer expanded so rapidly as to reach full scale status. For this reason, the demand for information processing increased all the more, and annually 70 to 80 computer centers were established after 1966. In comparison with the number of computer centers established during the first half of the 1960's, the increase was more than twice, and the forms of the organizations were varied. The information processing service industry was now in the state of development and it was recognized by society as a new industry.

And even within the information processing service industry, the software section was gradually assuming the shape of an independent unit, and software development was about to become an important operational part of the information processing service industry.

Because it was not necessary to have a large sum of money as initial capitalization or to have a large staff of personnel to engage in the software service, new participants organized successively and within a short time many software houses were established. However, the general public is still unaware of the value of software services, and since the bulk of software services had been furnished free of charge by the computer hardware dealers, the work of the software houses was equally divided, either by being commissioned by the computer hardware dealer or by direct order from the computer users.

(4) First half of the 1970's (period of stability)

During the first half of the 1970's, Japan's economy was one of stability and growth, and the many computer centers and software houses established during the second half of the 1960's were in a state of doldrum. However, information processing progressed not only as an industry, but also socially and economically, and at the same time the demand for information processing fulfilled varied uses, became highly developed and covered a wide field. As for the information processing service industry, the communication line was opened in September 1971, the public data network was opened in November 1972 and online use was expanded in 1976. Environmental readiness for online information processing was gradually accomplished and the structure of information processing is shifting from the heretofore predominant batch processing to the online remote batch system, indicative of the highly advanced state of the processing structure.

In software, with advancements in the specialization of computer application, specialized products for specific areas have begun to appear on the market, and there have been cases of information processing personnel of computer users of large firms utilizing the software technology to spin out and form independent businesses. Also computer manufacturers, information processing services, etc., have systematized the software houses, and even with the large software houses, there has been a noticeable trend to systematize the medium-small software houses by subcontracting simple operational jobs in the software development process.

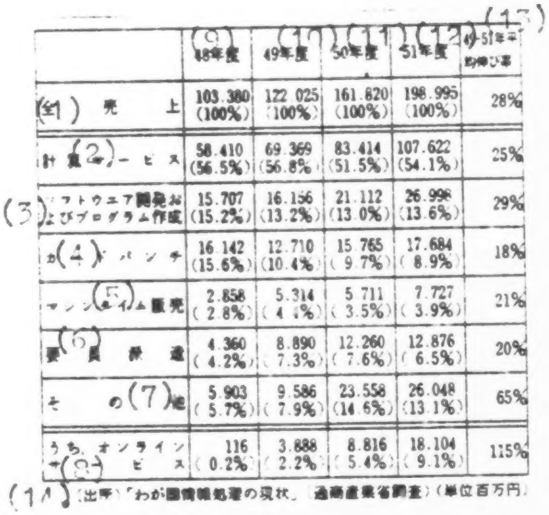
(5) From 1975 on

(a) Full scale operations of the online information processing service

The online information processing service turned full scale around FY 1974, and although considered to be a transitional phenomenon, the annual growth rate since then has been a remarkable 115 percent. (Table 1) The percentage of online information processing service in the total sales of information processing for FY 1976 reached about 10 percent.

Table 1. Progress of the Online Information Processing Services Within the Information Processing Industry

Key:
- (1) Total sales
- (2) Computing services
- (3) Software development and program preparation
- (4) Card punch
- (5) Machine time sales
- (6) Dispatch of personnel
- (7) Others
- (8) Online services
- (9) FY 1973
- (10) FY 1974
- (11) FY 1975
- (12) FY 1976
- (13) Average growth rate between 1974 to 1976
- (14) Source: "The Present State of Japan's Information Processing" "MITI Survey" Unit value in 1 million yen



	(9) 48年度	(10) 49年度	(11) 50年度	(12) 51年度	(13) 49-51年平均伸び率
(1) 総売上	103.380 (100%)	122.025 (100%)	161.820 (100%)	198.995 (100%)	28%
(2) 計算サービス	58.410 (56.5%)	69.369 (56.8%)	83.414 (51.5%)	107.622 (54.1%)	25%
(3) ソフトウェア開発およびプログラム作成	15.707 (15.2%)	16.156 (13.2%)	21.112 (13.0%)	26.998 (13.6%)	29%
(4) カードパンチ	16.142 (15.6%)	12.710 (10.4%)	15.765 (9.7%)	17.684 (8.9%)	18%
(5) マシンタイム販売	2.858 (2.8%)	5.314 (4.4%)	5.711 (3.5%)	7.727 (3.9%)	21%
(6) 要員派遣	4.360 (4.2%)	8.890 (7.3%)	12.260 (7.6%)	12.876 (6.5%)	20%
その(7)他	5.903 (5.7%)	9.586 (7.9%)	23.558 (14.6%)	26.048 (13.1%)	65%
うち、オンラインサービス (8)	116 (0.2%)	3.888 (2.2%)	8.816 (5.4%)	18.104 (9.1%)	115%

(14) (出所)「わが国情報処理の現状」(通商産業省調査)(単位百万円)

Remarks:
1. The aggregate business is considered to be that of the operations of information processing.
2. Disregarding the small differences in FY 1976, the percentage of total sales of online services, mentioned above, is 83 percent of the total sales of online services for the entire business of information processing operations.

A comparison of the online processing percentages of Japan and the United States is shown on Figure 4. In 1976 Japan's online processing percentage was about 17 percent, but in comparison with that for the United States, Japan is behind by about 10 years.

(b) Birth and full scale operations of the information furnishing services

An information furnishing service will perform retrieval, processing, etc., from the information file with computers, on request by others, and its birth occurred during the latter half of 1965.

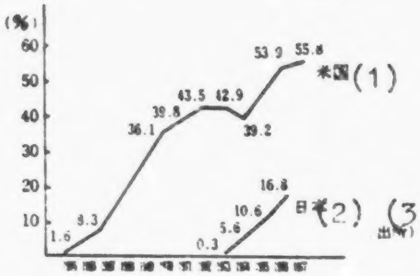


図4　オンライン処理率の日米比較

出所）米国：「海外の情報産業」(財)日本情報処理開発協会
日本：「わが国情報処理の現状」通産省

Figure 4. A Comparison of Japan and U.S. Online Processing Percentages

Key:
(1) United States
(2) Japan
(3) Sources: U.S. figures were obtained from "The Information Industry Abroad" published by the Japan Information Processing Development Association. Japanese figures were obtained from "The Present State of Japan's Information Processing" published by MITI.

Presently the furnishing services for securities, stock information, economic information, and science and technology publication information are about to reach full scale operations.

2. The Present State of the Information Processing Industry

(1) Scope of Business

As to the scope of business of Japan's information processing industry, small scale business predominate, partly because of the recency of the industry; 50 percent of the firms have an annual sale of less than 100 million yen and 95 percent of the firms have an annual sale of less than 1 billion yen. (Table 2)

Table 2. Percentage of Business Firms in Japan's Information Processing Industry Classified According to Annual Sales Amount

	Below 100 million yen	Between 100 million and 1 billion yen	More than 1 billion yen	Total percentage
1974	62.6%	34.4%	3.1%	100%
1975	57.8	37.7	4.5	100%
1976	53.7	41.4	4.9	100%
1977	51.3	43.9	4.8	100%
1978	49.9	44.8	5.3	100%

Source: "Survey Report on the True State of Exceptional Services" by MITI

(2) Sales and Number of Employees

There were 1,300 business firms in the information processing industry, as of 1978, and indicative of rapid growth was the total annual sales reaching 460 billion yen. The total number of employees was 77,000. (Table 3)

Table 3. Number of Business Firms, Employees and Annual Sales of Japan's Information Processing Industry

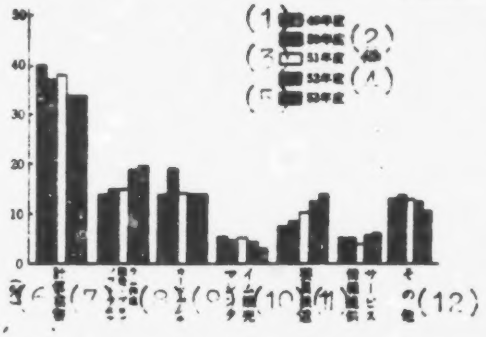
	Number of business firms	Total employees	Annual sales	Per business firm (average) Number of employees	Per business firm (average) Annual sales	Annual sales per capita
1974	1,322	59*	2,453**	44***	186****	4.2*****
1975	1,276	57	2,751	45	216	4.8
1976	1,276	59	3,070	46	241	5.2
1977	1,640	72	4,126	44	252	5.8
1978	1,672	77	4,602	46	275	6.0
Average growth rate from 1974 to 1978	6.0%	6.9%	17.0%	-	-	-

Source: "Statistics and Survey Report on the Actual State of the Exceptional Services" MITI

* Unit of 1,000 persons
** Unit of 100 million yen
***Unit of person
**** Unit of 1 million yen
*****Unit of 1 million yen

(3) Operations Breakdown

A breakdown of sales by operations showed that computing was the highest, reaching a total of 150 billion yen, followed by software development and program preparation of 89 billion yen and dispatch of personnel of 67 billion yen. A review of the sales operations graph reveals a marked growth in the percentages for software development and program preparation, and dispatch of personnel. (Figure 5)



Key:
(1) FY 1974
(2) FY 1975
(3) FY 1976
(4) FY 1977
(5) FY 1978
(6) Computing services
(7) Software development and program preparation
(8) Card punch
(9) Machine time sales
(10) Dispatch of personnel
(11) Information furnishing services
(12) Others

Source: "Survey on the Actual State of the Specialized Services" by MITI

Figure 5. Past Sales Performances in Percentages of the Various Services of Japan's Information Processing Industry

(4) Difference in Scope of Business Between Japan and the United States

Again a big gap exists in the scope of business in the information processing industry between Japan and the United States. (Table 4)

Table 4. A Comparison of the Principal Software Services in Japan and the United States

	United States (see Remark 1)	Japan (see Remark 2)
Total sales	34 billion yen	4.5 billion yen
Gross profit	2 billion yen	200 million yen
Number of employees	5,528 employees	473 employees

Remark 1. Average of the five principal companies in the United States Computer Science Corporation, Planning Research Corporation, Automatic Data Processing Inc., Informatics, System Development Corporation

Remark 2. Average of 17 representative Japanese software companies which have contributed to the Joint System Development Co., Ltd.

3. Principal Promotional Measures

In recognition of the fact that the information processing industry is not only an essential industry supporting information-conversion, but that it is a model, knowledge-intensive industry that conserves resources, is pollution free and has a high additional value, the government has instituted positive promotional measures. Those in force now are shown on Table 5 and a summary of the principal measures is given as follows:

(1) Operations of the Association to Promote Information Processing Activities

This association was established in 1970 as an agency to assist in promoting program development and use, information processing business, etc., so as to promote information processing through sophisticated use of electronic computers. (Figure 6)

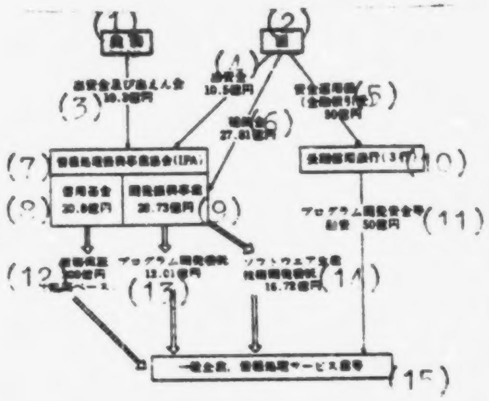


Figure 6. Flow of Operations of the Association to Promote Information Processing Activities As of FY 1980

Key:
(1) Private
(2) Government
(3) Contributing fund or participation fund 1.03 billion yen
(4) Contributing fund 1.05 billion yen
(5) Fund management section Underwrite bank debentures 5 billion yen
(6) Subsidies 2.781 billion yen
(7) Association to Promote Information Processing Activities
(8) Credit fund 2.08 billion yen
(9) Activities to promote development
(10) Long-term credit bank
(11) Financing such as program development funds, etc. 5 billion yen
(12) Suretyship obligation 20.8 billion yen (based on balance)
(13) Program development consignment 1.201 billion yen
(14) Consignment for technological development of software production 1.672 billion yen
(15) Business in general, information processing services, etc.

Table 5. List of Programs to Promote the Information Industry

			(Budget for FY 1979)	(Budget planned for FY 1980)
To promote the information industry To accelerate use of information	To promote hardware	1. Subsidies to accelerate the development of an electronic computer with the next generation	(8.61 billion yen)	(5.785 billion yen)
		2. Development Bank loan to the Japan Electronic Computer Co., Ltd.	(within 50 billion yen)	(within 48 billion yen)
		3. Development Bank loan for structural improvement	(within 50 billion yen)	(within 48 billion yen)
		4. Special redemption fund for high performance electronic information remote processing apparatus	-	-
	To promote software	1. Software production technological development plan	(1.52 billion yen)	(1.67 billion yen)
		2. Subsidies for operational expenses of The Council for the Promotion of Information Processing (includes above 10)	(2.58 billion yen)	(2.78 billion yen)
		3. Financial measure for information processing promotion (underwrite bank debenture)	(7 billion yen)	(5 billion yen)
		4. Development Bank loan to nurture technicians for software development and information processing	(within 50 billion yen)	(within 48 billion yen)
		5. Reserve fund system for general-use software development	-	-
		6. Reserve fund system for program guarantee	-	-
	To advance systems development	1. Development of pattern information processing system (large-scale project of the Agency of Industrial Science and Technology)	(2.8 billion yen)	(1.846 billion yen)
		2. Development of a health care network system	(190 million yen)	(220 million yen)
		3. Development of a substitute energy type community energy system	(9 million yen)	(42 million yen)
		4. Development of a trade information system	(25 million yen)	(34 million yen)
		5. Development Bank loan to accelerate usage of information processing system	(within 50 billion yen)	(within 48 billion yen)
	Basic preparation to use of information	1. Survey on the actual state of information processing	(16 million yen)	(16 million yen)
		2. Survey on statistics of electronic computer orders fulfilled	(5 million yen)	(5 million yen)
		3. Survey on industries by classification converting to systems	(2 million yen)	(2 million yen)
		4. Survey on legal protection of software	(6 million yen)	(6 million yen)
		5. Program survey record	(2 million yen)	(2 million yen)
		6. Information processing technicians' exam	(62 million yen)	(68 million yen)
		7. Comprehensive survey on problems of information processing technicians	(2 million yen)	(2 million yen)

[Table 5 continued]

8. Safety measures for the information processing services	(0 million yen)	(2 million yen)
9. Safety measures for software, etc.	(700,000 yen)	(700,000 yen)
10. Loan system to accelerate safety measures for the electronic computer system (Development Bank) (medium and small financial institutions)	(within 50 billion yen for Development Bank) (3 billion yen for medium and small financial institutions)	(within 48 billion yen for Development Bank) (3 billion yen for medium and small financial institutions)
11. Register system for the information processing service business	(1 million yen)	(1 million yen)
12. Information changeover week	(400,000 yen)	(400,000 yen)
13. Subsidies to introduce electronic computers to Chambers of Commerce and others	(127 million yen)	(100 million yen)

The following activities are carried out to promote information processing:

(1) Commission development of highly advanced, general purpose programs which are difficult to be developed by private business.

(2) Sale of commission developed programs.

(3) Assume suretyship obligation for funds borrowed to sophisticate operations etc., from banking institutions by information processing businesses, etc.

(4) Conduct research on information processing and disseminate results.

(2) Promotion of Software Production Technology and Development Plan

Serve as a basis to develop a new system of automatic preparation with the editing and assembly of the program modules to replace program production by manual means as performed today and to establish the software industry as an independent industry with a modern production system.

This plan is a large scale project to extend for a period of 6 years, beginning in FY 1976, and will peak onprogram preparation in FY 1980. The sum of 1.672 billion yen is programmed for the development.

The development is being stepped up by commissioning the Association to Promote Information Processing Activities in place of the Joint Systems Development Co. (capitalized by 17 principal software business firms and 13 banks) which had been established in April 1976 to undertake said plan's development as its principal assignment.

(3) Security measures for the information processing services

Establish security measures with the electronic computer system of the information processing services to protect against any disruption of economic and social activities caused by such actions as data destruction from data leakage, fire, earthquake, etc., against any invasion of privacy, etc., and financing will be obtained from the Development Bank or any middle-small finance institution for any of the facilities. From FY 1980, enforcement of the security measures of the information processing services will be based on requests by the private interests, for registration and public release.

(4) Program reserve fund system

In order to establish software as a contractable item and to familiarize software as a marketable product, development of top grade software, especially general purpose software with high productivity must be accelerated. For this purpose, when general purpose software is developed and sold, the system will recognize 50 percent of the income, as the limit, to be deposits for the reserve fund.

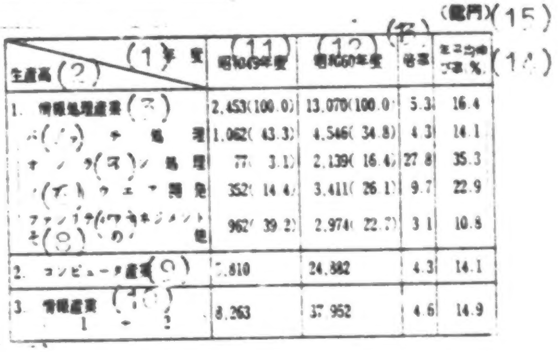
To retain the soundness of software business operations, based on the gratuitous repair contract of more than a year, attached to the independently prepared program, in case gratuitous repair is actually performed, then 0.25 percent (sic) of the sales on subject program will be acknowledged as a deposit for the reserve fund.

4. Future Outlook and Topics

According to the report "Japan's Information Status in FY 1985 and Forecast of the Growth of the Information Industry" prepared by the Information Industry Committee of the Industrial Structure Council in July 1976, sales of the information processing industry which had been 245.3 billion yen in FY 1974 will reach 1.307 trillion yen in FY 1985 or a growth percentage of 16.4 percent which will be higher than that of the computer industry. On the percentage of the information processing industry within the total information industry, it is interesting to note that the roughly 29 percent for FY 1974 will increase to about 34 percent in 1985. (Table 6)

Table 6. Forecasts on Sales of the Information Industry

Key:
- (1) Showa year designation
- (2) Total sales
- (3) Information processing industry
- (4) Batch processing
- (5) Online processing
- (6) Software development
- (7) Facilities management
- (8) Others
- (9) Computer industry
- (10) Information industry
- (11) FY 1974
- (12) FY 1985
- (13) Magnification (number of times)
- (14) Annual average increase percentage
- (15) Unit value=100 million yen



(億円)(15)

年度 (1) / 生産高 (2)	(11) 昭和49年度	(12) 昭和60年度	(13) 倍率	年平均伸び率 % (14)
1. 情報処理産業 (3)	2,453(100.0)	13,070(100.0)	5.3	16.4
バッチ処理 (4)	1,062(43.3)	4,546(34.8)	4.3	14.1
オンライン処理 (5)	77(3.1)	2,139(16.4)	27.8	35.3
ソフトウェア開発 (6)	352(14.4)	3,411(26.1)	9.7	22.9
ファシリティマネジメント (7) その他 (8)	962(39.2)	2,974(22.7)	3.1	10.8
2. コンピュータ産業 (9)	5,810	24,882	4.3	14.1
3. 情報産業 (10) 1 + 2	8,263	37,952	4.6	14.9

Based on the report "Numerical Forecasts on Japan's Information Conversion and Performance of the Information Industry During the Second Half of the 1980's and the First Half of the 1990's" by the Information Industry Committee of the Industrial Structure Council

(2) Topics

The information processing industry is a representative, knowledge-intensive industry, but since its history as an industry is short, its operational base as a business is weak. And because it is intangible, its value consciousness is weak which is a trait peculiar to the Japanese. Thus, of common interest are such activities as upgrading the information processing technology, training technicians to support this technology, strengthening the economic base relative to funds and establishing values on software, etc.

Comments on the individual services are as follows:

a. Software service: Upgrading software productivity, strengthening software development and accelerating software circulation must be effected; to accomplish this, software production technology, general practice technology, development of assessment technology and preparation of a circulation base must be accomplished.

b. Information processing service: Development of the technology on the effective use of the computer chamber, online technology, TSS technology, network technology, etc., and storage must be promoted. Plan to strengthen the security measures of the electronic computer system, beginning with data protection. The smooth execution of social responsibility will be required.

(c) Information furnishing service: Development of data conversion maintenance, data management, online retrieval, etc., as well as mass data storage processing multi-use possibility of the information furnishing service must be effected.

(3) Hope of the information processing industry

The information processing industry will have an enormous market, if the latent demand is included, and a bright future; its prospects as an industry with high employment potential is good; and depending on whether the information processing industry furnishes service of acceptable standards, the upgrading of the national livelihood and the international competitiveness of the other industries will be influenced. For this reason, it is strongly hoped that Japan's information processing industry will wipe out the gap existing between the advanced countries of Europe and the United States, and effect a smooth growth.

Optical Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6 Jun 80 pp 52-55

[Article by the Electronic Equipment and Electrical Machinery Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Special Features of the Optical Industry Technology

The optical industry technology is a technology that uses light or electromagnetic waves with a frequency several digits higher than that used in electronics technology for information transmission, information processing, instrumentation control, etc. (Figure 1)

This technology consists of laser, light receiving element, light fiber, etc., and it has the following special properties:

(1) High speed, wide-range transmission and processing possible. (Far beyond comparison with electronics used heretofore, and it is possible to transmit the process large volumes of information at high speed.)

(2) High speed transmission and processing of image information possible

(3) Lightweight optical fiber for transmission line use.

(4) Optical element can be used as an infinitesimally small size circuit element like in VLSI.

(5) Use of copper wire is not necessary, contributing to resource conservation.

(6) Electromagnetic noise interference eliminated.

(7) Serves as an electrical insulator.

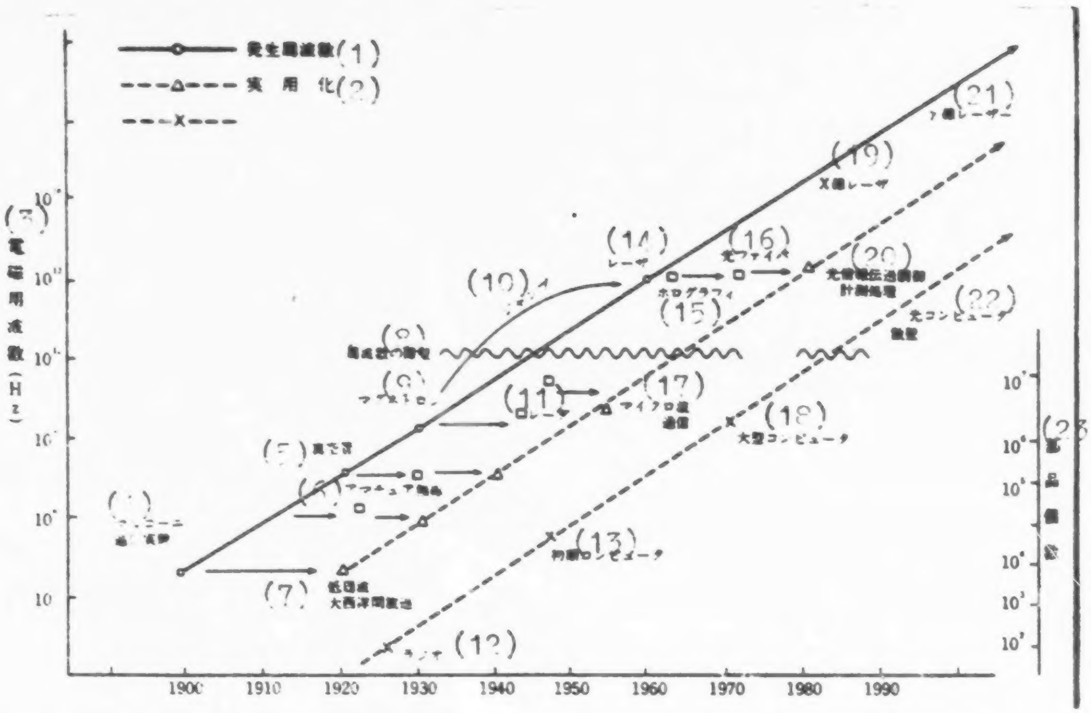


Figure 1. Outline of th. Optical Industry Technology

Key:
- (1) Generated frequency
- (2) Practical application
- (3) Electromagnetic wave frequency
- (4) Marconi's communication experiment
- (5) Vacuum tube
- (6) Amateur wireless
- (7) Low frequency; broadcast across the Atlantic Ocean
- (8) Frequency barrier
- (9) Magnetron
- (10) Jump
- (11) Radar
- (12) Radio
- (13) Early phase computer
- (14) Laser
- (15) Holography
- (16) Optical fiber
- (17) Microwave communication
- (18) Large-size computer
- (19) X-ray laser
- (20) Optical information transmission control; measurement processing
- (21) Gamma ray laser
- (22) Optical computer; (numbers barrier?)
- (23) Component count

(8) Optical fiber and other materials are fireproof, waterproof and rustproof.

2. Development Stages of the Optical Industry Technology

Optics was utilized for communication as far back as prehistory, and the history of optical science, as exemplified by the microscope which uses the lens technology, is long, but it was the successful laser emission in 1960 by Meiman that heralded the era of optoelectronics and as today's technological innovation, its history is only 20 years old. (Tables 1 and 2)

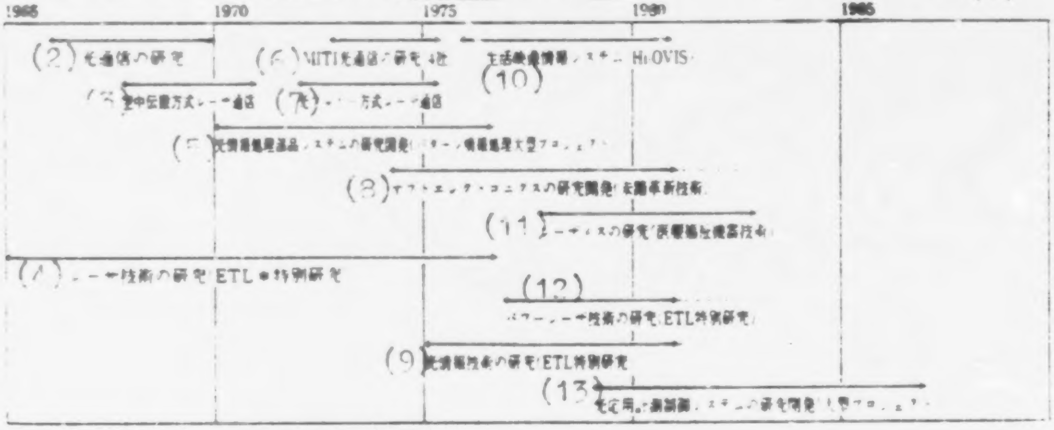
Table 1. Development Stages of Optical Technology of the World

	1950's	1960's	1970's	1980's
	Theory of laser announced (1951)	Ruby laser oscillations (1960)	Gallium aluminum arsenide (semiconductor) laser, continuous oscillations at room temperature (1970)	
	Semiconductor laser theory (1958)	Helium-neon laser oscillations (1961)	Gallium Indium Arsenide Phosphorus laser oscillations (1976)	
	Glass fiber for medical use discovered (1951)	Gallium arsenide (semiconductor) laser oscillations (1962) YAG laser oscillations (1964) Carbon dioxide laser oscillations (1964) Graded type fiber submitted (1964)	Semiconductor laser with longevity performance (1977) Low loss glass fiber developed (1970)	
	Optoelectronics proposed (1955)	Glass fiber with low loss proposed (1966)	Pure quartz core fiber developed (1972)	Laser functions Fiber functions Hologram functions
	Holography developed (1950)	Graded type fiber developed (1969)	Extremely low loss optical fiber developed (1976) New method for continuous manufacturing of optical fiber invented; (VAD method) (1977)	
	Space filtering developed (1953)	Optical integrated circuit (Optical IC) proposed (1969) Luminous flux holograph developed (1962)	(chu) infrared region fiber developed (1978) Wave-type optical forking circuit developed (1973) Wave path hologram developed (1976) Autobonding semiconductor laser (1975)	All optical integrated circuit Picosecond optical technology
Optical information technology	Information collection (Optical measurement)	Laser radar (1962) Measuring with holography interference (1965) Laser spectrometry (1968)	Pollution sensing laser (1970)	Space optical measuring system Oceanic optical measuring system Energy measuring system

[Table 2 continued]

Optical information technology	Information transmission (Optical communication)	Laser communication with atmospheric propagation (1965)	Optical fiber communication (1970) Optical fiber reflex communication (1974) Home reflex information system (1976) Public communication system with optical fiber (1978)	Space optical communication system Oceanic optical communication system Energy information system
	Information processing	Holography pattern recognition (1964) Optical disk memory (1965) Holography memory (1967)	Laser facsimile (1973) Laser POS (1975) Laser video disk (1975)	Optical computer Three dimensional display Large capacity optical disk file
Optical energy technology	Optical processing	Laser (scriber?) (1963) Laser drill (1965)	Laser welding (1975)	Laser bombardment
	Laser with large output utilized	Laser plasma generation (1968)	Uranium concentrates with laser (1975) Laser annealing (1976)	Nuclear fusion with laser Isotope separation
	Optical energy transmitted	Laser (mes) (1965)	Energy transmission with optical fiber (1974)	All optical telephone Oceanic ranch

Table 2. Progress on Optical Technology Undertaken by MITI ETL：電子技術総合研究所 (1)



Key: (1) Electrotechnical Laboratory (ETL)
(2) Research on optical communication
(3) Space propagation type laser communication
(4) Research on laser technology; special research at ETL
(5) Research and development on optical information processing component system (large scale project on pattern information processing)
(6) Research on MITI's optical communication (four companies)
(7) Laser communication by optical fiber method
(8) Research and development on optoelectronics (hitherto unexplored innovative technology)
(9) Research on optical information technology (special research at ETL)
(10) Home reflex information system
(11) Research on laser (mes) (technology for medical and welfare equipment)
(12) Research on power laser technology (special research at ETL)
(13) Research and development on a measurement control system for optical applications (large-scale project)

The following is an outline of its development stages:

a. 1960's: Basic research on coherent laser.

b. 1970's: Semiconductor laser and optical fiber technology established.

c. 1980's: Practical application of optical communication; research on optical IC, etc.; trial manufacture of prototypes. The 1980's will finally be the period when optical information technology will move from the test chamber level to practical application.

Japan initiated research around 1961, soon after Meiman's success. A research chamber was established in the Electrotechnical Laboratory of the Agency of Industrial Science and Technology in 1965 to pioneer Japan's research in the discipline and it played a big role in such activities as trial manufacturing Japan's first optical and communications fiber unit of the ETLOF series. Thereafter, the Nippon Telegraph and Telephone Public Corporation began full scale research and development on communications application of the optical industry technology from 1973, and research was stepped up in conjunction with research units of private companies, universities, etc.

The basic studies for research and development on optical industry technology were U.S. oriented but recently remarkable achievements in the field of optical fiber, etc., have been made in Japan.

3. Outlook, Policies and Direction of the Optical Industry Technology

The optical industry technology, which had gone through the above described development stages, will be gradually introducing the applied field (Figure 2), and it is predicted that, after fulfilling the phases described below, they will be the mainstays in the information field (including a part of energy transmission) during the years 1985 to 2000. These can be generally described in three phases:

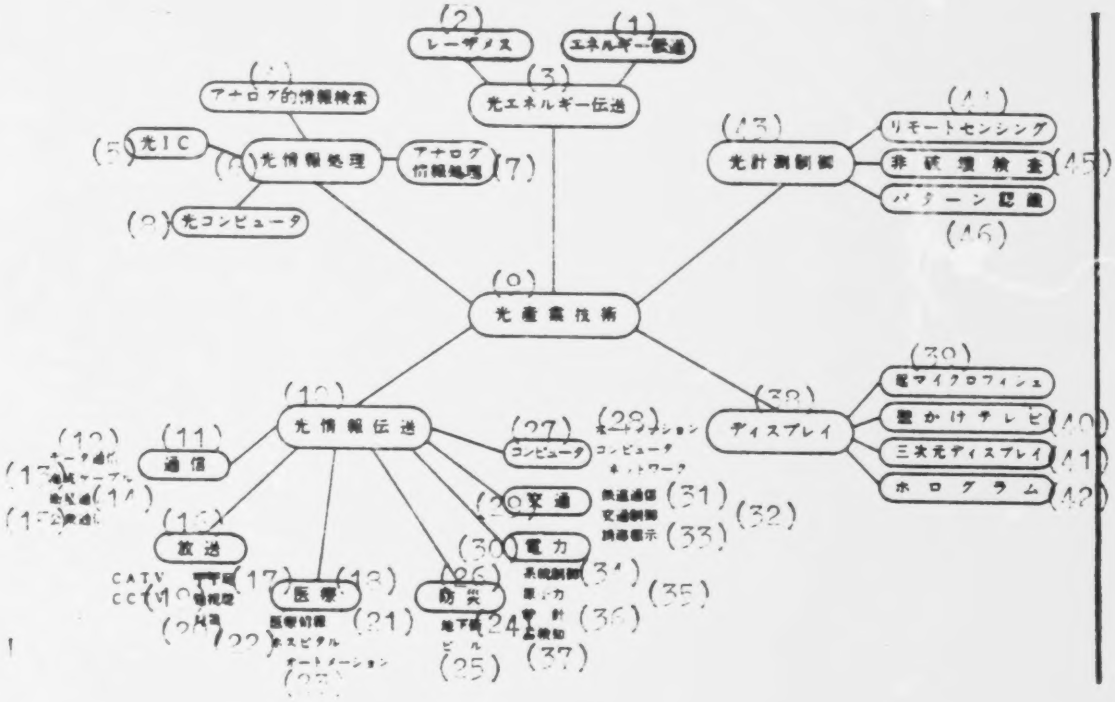

(1) エネルギー伝送
(2) レーザメス
(3) 光エネルギー伝送
(4) アナログ的情報検索
(5) 光IC
(6) 光情報処理
(7) アナログ情報処理
(8) 光コンピュータ
(9) 光産業技術
(10) 光情報伝送
(11) 通信
(12) データ通信
(13) 海底ケーブル
(14) 衛星通信
(15) 公衆通信
(16) 放送
CATV
CCTV
(17)
(18) 医療
(19) 難視聴
(20) 対策
(21) 医療情報
(22) ホスピタル
(23) オートメーション
(24) 地下街
(25) ビル
(26) 防災
(27) コンピュータ
(28) オートメーション コンピュータ ネットワーク
(29) 交通
(30) 電力
(31) 鉄道通信
(32) 交通制御
(33) 誘導標示
(34) 系統制御
(35) 原子力
(36)
(37)
(38) ディスプレイ
(39) マイクロフィッシュ
(40) 壁かけテレビ
(41) 三次元ディスプレイ
(42) ホログラム
(43) 光計測制御
(44) リモートセンシング
(45) 非破壊検査
(46) パターン認識

Figure 2. Fields of Application in the Optical Industry Technology

Key:
(1) Energy transmission
(2) Laser (mes)
(3) Optical energy transmission
(4) Analog information retrieval
(5) Optical integrated circuit
(6) Optical information processing
(7) Analog information processing
(8) Optical computer
(9) Optical industry technology
(10) Optical information transmission
(11) Communications
(12) Data communication
(13) Oceanbed cable
(14) Satellite communication
(15) Public communication
(16) Broadcasting
(17) Post office
(18) Medical treatment
(19) Visual-aural difficulty
(20) Measures
(21) Medical information
(22) Hospitals
(23) Automation
(24) Underground passageway
(25) Buildings
(26) Prevention of disasters
(27) Computers
(28) Automation computer network

[Key to Figure 2, continued]

(29) Transportation
(30) Electric power
(31) Railway communication
(32) Traffic control
(33) Inductive indicator
(34) Systems control
(35) Atomic energy
(36) Meter inspection
(37) Lightning detector
(38) Display
(39) Priming microfiche
(40) Wall mV
(41) Three dimensional display
(42) Hologram
(43) Optometry control
(44) Remote sensing
(45) Non-destructive exam
(46) Pattern recognition

Phase I. Use of optical fiber in place of copper wire, used heretofore, as the transmission line which is a part of the existing electronics system (evidence of this switchover already seen today.)

Phase II. Use of the optical functional element for signal processing, beginning from both ends of the optical fiber; functions of the optical switch, optical branch, optical (bunpa), optical modulation, optical sensor, etc., will be upgraded.

Phase III. The optical industry technology will become the core of the system technology and the entire system will be integrated with this technology.

A study is required on the transition of these stages, but it is felt that in Phase I a part of practical application had started in the latter half of the 1970's and an item with optical function will be developed beyond expectation in the 1980's; Phase II will take place between the mid-1980's to mid-1990's; Phase III will start from the late 1980's to full scale conversion in the mid-1990's.

Until recently, the optical industry technology in the various countries was limited to the research lab level, but focusing on communications application, they began to exert efforts with research and development on the optical industry technology that could penetrate the limits of technology used heretofore.

In order for Japan to gain a firm position in the electronics industry and subsequently the optical industry, it must by all means develop the optical industry as an entirely new type of industry. The requirements are:

(1) Technological development

(2) Apply results of the technological development in society

(3) Measures to integrate the surveys on the optical industry technology and optical industry, and future plans must be made.

From the standpoint of needs, the accomplishments from technological development will be (1) (image) information transmission, (2) (image) information file, (3) instrumentation control and (4) computers; from the standpoint of (shizu), the accomplishments will be (1) optical IC technology, (2) optical transmission line technology, (3) optical sensor technology and (4) optical actuator technology. To conduct research and development on these subjects, the governmental experimental and research agencies, and private company research units must conduct assignments to suit the character of their individual organization, and whose research themes can be fulfilled.

Presently the Agency for Industrial Science and Technology is engaged in the development of a large scale project on the optical applied instrumentation control system, but on optical IC technology and related subjects which would be the nucleus, from the long range viewpoint the exploratory basic research would be conducted at the Electrotechnical Laboratory and other agencies, and the actual applied research would be conducted by private companies, and in order to coordinate these comprehensive developments, the projects must proceed with the promotion of an efficient, intensive research.

As to the results of technological development applied in society, studies of the practical applications, demonstration tests and similar tests must be made on the applications in the various social systems and industrial systems of the various high level technologies derived from the above technological developments.

Growth and expansion are strongly expected of the optical industry which, along with the computer and atomic power industries, will be taking a central role in Japan's industrial structure. And especially since the optical industry technology is in the germinating stage of a technology, Japan has the capability of taking the initiative before the rest of the world to develop this discipline. The thought of becoming the world's frontrunner in this type of industry may be the first to be attempted, but it should be one of the challenges Japan should face going into the 21st century.

Engineering Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6 Jun 80 pp 56-61

[Article by the Industrial Machinery Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Development Stages of the Engineering Industry

Japan's engineering industry was pioneered by chemical engineering with the resumption of petroleum refining during 1950-1954, and with the backing of investments from flourishing institutions, private companies in the varied fields of industry such as machinery, electrical equipment, iron and steel, chemical textiles and construction became suppliers and makers of industrial equipment, and as users they accumulated high level knowledge on engineering.

With the increasing demand for such activities as plant export and pollution prevention, and the expansion of various enterprises and the effective utilization of manpower, etc. based on accumulated engineering knowledge, positive development of business enterprises furnishing engineering services or new business enterprises had been evident from 1965 on. Recently this intensity of expanding operations has been noted with the engineering aspects of the iron and steel, shipbuilding, heavy machinery, and the building and construction industries.

A review of the number of engineering companies or companies that include engineering operations shows a rapid increase from a mere collection of 10 companies in 1955 to about 70 companies in 1965, and today there are more than 300 companies.

In this manner, the engineering industry has gained its place, a new industry that has grown and one that is expected to be a pillar to support Japan's economic growth in the next generation.

2. The Present State and Problems of the Engineering Industry

Although the development of Japan's engineering industry has been remarkable, it is still in the developing stage and a wide gap still exists in technology and business operations with the leading nations of Europe and the United States. In the conditions that would serve as basis for growth hereafter, many of the problems given below are included:

(1) Regarding Japan's engineering industry whose growth had been supported by private investment institutions and plant exports, even to this day, 70 to 80 percent of its sales was derived from production equipment for chemical plants, power plants, iron and steel plants, etc. Japan has limited experience and lacks engineering knowledge to meet the rise in new social needs hereafter and to actively exploit such fields in public welfare as medical, urban development, education, transportation at home and abroad.

(2) Even with resources and energy whose importance will increase greatly hereafter and with production facilities, the software technology which is the key to engineering of the processing know-how has continued to be imported from abroad, the scope of Japan's engineering capability has been limited and its base is shallow.

(3) On the basic engineering techniques such as process management, cost management and document management which play important roles in the accomplishment of large scale projects, Japan is still immature when compared with European nations and the United States, and even its current practices cannot be considered fully adequate.

(4) As to key personnel who are basic requisites in determining engineering capability, the problem of quantity and quality has surfaced. Of deep concern is the lack of project managers who can oversee and manage the entire project. As to number of people who can supervise large projects, Japan has less than 200, but for those who can manage large, international-scale projects, Japan has less than 100. Problems exist not only in nurturing these key personnel but also in revising the educational system, the employment system, etc.

(5) Partly because of its short history, assessment standards on engineering activities have not been adequately established and the prevailing practice is still to consider such service as gratis. Especially during that stage of consulting and related work before designing, nothing has been established on payment for services. Added to this situation is the fact that on taxes and finances, the engineering business is backward and the business operation which supports the engineering industry is still weak.

In order to conduct engineering activities which is dependent on the type of project engaged in, it is important that the engineering personnel of the different companies or the engineering firm and equipment manufacturers or others must meet in various ways to cooperate and collaborate, and to concentrate their individual capabilities and functions. But the engineering business itself has a short history and because it is an offshoot from various industries, it is difficult to promote cooperation and collaboration because the order of the business world structure is extremely backward. The lack of publications on engineering terminologies, contracts and other documents, the standardization and normalization of hardware and software of related equipment, lack of information that would be of common use with other industries, a study of laws and regulations related to engineering, etc., are matters which indicate the inadequacy of the foundation of the engineering industry.

3. Promotional Policies of the Engineering Industry

(1) Strengthening engineering technology

It is conjectured that the activities of the engineering industry in the 1980's will make a large turn from activities related to production facilities as in the past to those related to resources and energy as well as on public welfare. In line with this, the engineering industry must place outstanding key personnel in the fields of resources, energy and public welfare with a long range viewpoint and it must exert positive efforts in the engineering requirements of these fields.

On the above viewpoint, the following measures must be taken:

(1) Conduct feasibility studies and other studies on resources and energy related projects. (Figure 1)

Relative to resources and energy, large projects on petroleum storage, coal liquefaction, nuclear power generation, geothermal heat generation, etc., are about to be executed, but the engineering industry must conduct feasibility studies on these projects in order to exert its engineering capabilities.

As to the engineering phase of research and development that must be made on underground petroleum storage, coal liquefaction, use of hot drainage water from nuclear power generation, geothermal power generation, geothermal hot water use, etc., the decision to strengthen the engineering capability must be made only after conducting joint research with the related businesses.

(2) Development and practical application of the public welfare type systems. (Figure 2)

In order to determine the development and practical application of the public welfare type systems, the following measures must be positively enforced:

(a) Promote a joint development agreement for the public welfare types systems. In order to respond to the social needs of the national and local autonomous agencies, a joint development agreement must be actively promoted for a public welfare type system of a high community level.

(b) Promote the construction of a showplace for the public welfare system. Promote the construction of a showplace for demonstrations of the researched and trial manufactured public welfare type system in order to obtain the reaction of the general public.

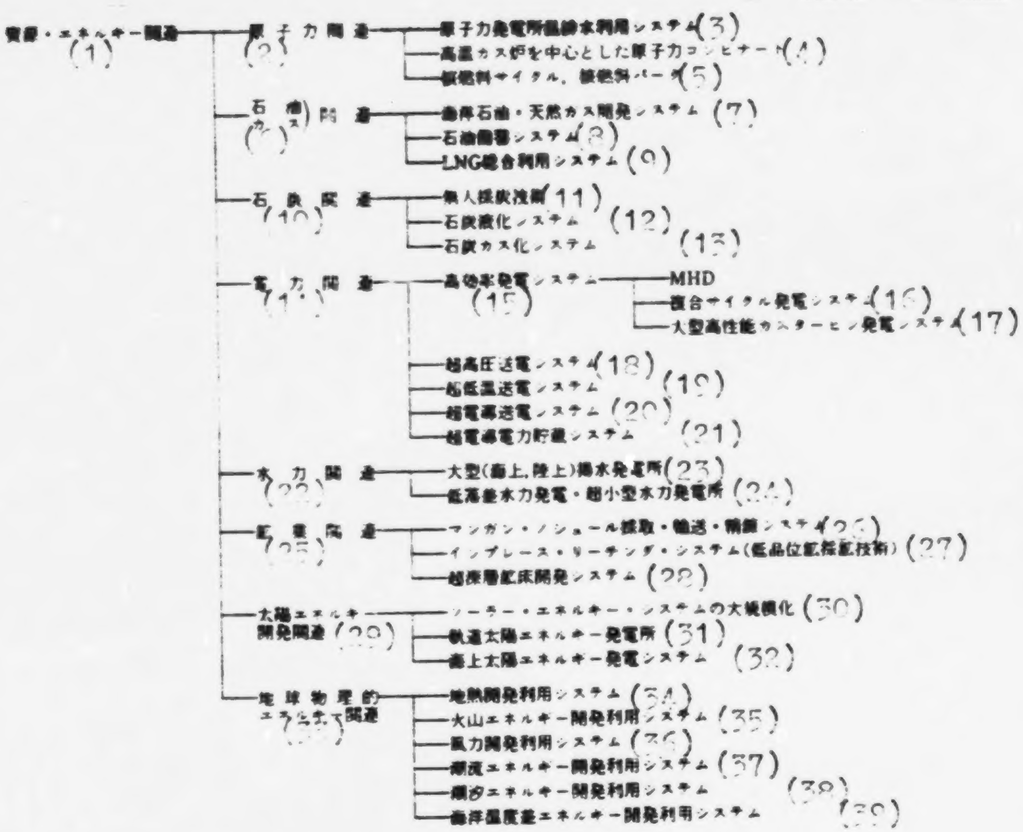

資源・エネルギー関連 (1)
原子力関連 (2)
原子力発電所温排水利用システム (3)
高温ガス炉を中心とした原子力コンビナート (4)
核燃料サイクル，核燃料パーク (5)
石油(ガス)関連 (6)
海洋石油・天然ガス開発システム (7)
石油備蓄システム (8)
LNG総合利用システム (9)
石炭関連 (10)
無人採炭技術 (11)
石炭液化システム (12)
石炭ガス化システム (13)
電力関連 (14)
高効率発電システム (15)
MHD
複合サイクル発電システム (16)
大型高性能ガスタービン発電システム (17)
超高圧送電システム (18)
極低温送電システム (19)
超電導送電システム (20)
超電導電力貯蔵システム (21)
水力関連 (22)
大型(海上,陸上)揚水発電所 (23)
低落差水力発電・超小型水力発電所 (24)
鉱業関連 (25)
マンガン・ノジュール採取・輸送・精錬システム (26)
インプレース・リーチング・システム(低品位鉱採鉱技術) (27)
超深層鉱床開発システム (28)
太陽エネルギー開発関連 (29)
ソーラー・エネルギー・システムの大規模化 (30)
軌道太陽エネルギー発電所 (31)
海上太陽エネルギー発電システム (32)
地球物理的エネルギー関連 (33)
地熱開発利用システム (34)
火山エネルギー開発利用システム (35)
風力開発利用システム (36)
潮流エネルギー開発利用システム (37)
潮汐エネルギー開発利用システム (38)
海洋温度差エネルギー開発利用システム (39)

Figure 1. Resource and Energy Related Projects

Key:
(1) Resource and energy related
(2) Nuclear power related
(3) A system to utilize hot drainage water from a nuclear power plant
(4) Nuclear power complex built around high temperature gas reactors
(5) Nuclear fuel cycle and nuclear fuel park
(6) Petroleum gas related
(7) Oceanic petroleum and natural gas development system
(8) Petroleum emergency storage system
(9) LNG comprehensive use system
(10) Coal related
(11) Unattended coal mining technology
(12) Coal liquefaction system
(13) Coal gasification system
(14) Electric power related
(15) High efficiency electric power system
(16) Compound cycle power generation system
(17) Large-scale, high performance gas turbine power generation system
(18) Extra high voltage power transmission system
(19) Extra low temperature power transmission system
(20) Superconduction power transmission system [Key continued]

[Key continued from previous page]

(21) Superconduction electric power storage system
(22) Water power related
(23) Large scale pumped water power plant (on sea and on land)
(24) Low head hydroelectric power plant and extra small type hydroelectric power plant
(25) Mining related
(26) Manganese nodule collecting, transporting and refining system
(27) (Impress reaching?) system (low grade ore mining technology)
(28) Extra deep ore bed stratum development system
(29) Solar energy development related
(30) Solar energy system on a massive scale
(31) Orbiting solar energy power station
(32) Maritime solar energy power station
(33) Geophysical energy related
(34) Geothermal development and use system
(35) Volcanic energy development and use system
(36) Wind velocity development and use system
(37) Tidal energy development and use system
(38) Oceanic tide energy development and use system
(39) Oceanic temperature differential energy development and use system

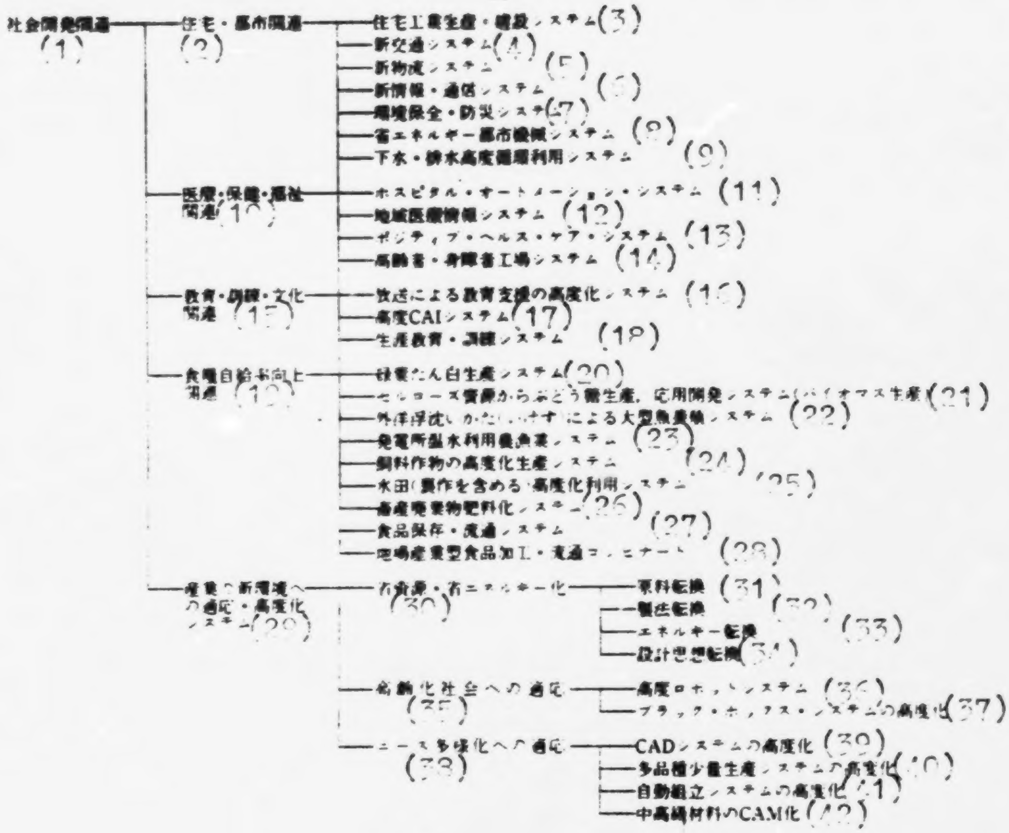

社会開発関連 (1)
住宅・都市関連 (2)
住宅工業生産・建設システム (3)
新交通システム (4)
新物流システム (5)
新情報・通信システム (6)
環境保全・防災システム (7)
省エネルギー都市機能システム (8)
下水・排水高度循環利用システム (9)
医療・保健・福祉関連 (10)
ホスピタル・オートメーション・システム (11)
地域医療情報システム (12)
ポジティブ・ヘルス・ケア・システム (13)
高齢者・身障者工場システム (14)
教育・訓練・文化関連 (15)
放送による教育支援の高度化システム (16)
高度CAIシステム (17)
生涯教育・訓練システム (18)
食糧自給率向上関連 (19)
緑葉たん白生産システム (20)
セルロース資源からぶどう糖生産, 応用開発システム(バイオマス生産) (21)
外洋浮沈いかだ(いけす)による大型魚養殖システム (22)
発電所温水利用養魚業システム (23)
飼料作物の高度化生産システム (24)
水田(畑作を含める)高度化利用システム (25)
畜産廃棄物肥料化システム (26)
食品保存・流通システム (27)
地場産業型食品加工・流通コンビナート (28)
産業の新環境への適応・高度化システム (29)
省資源・省エネルギー化 (30)
原料転換 (31)
製法転換 (32)
エネルギー転換 (33)
設計思想転換 (34)
高齢化社会への適応 (35)
高度ロボットシステム (36)
ブラック・ボックス・システムの高度化 (37)
ニーズ多様化への適応 (38)
CADシステムの高度化 (39)
多品種少量生産システムの高度化 (40)
自動組立システムの高度化 (41)
中高級材料のCAM化 (42)

Figure 2. Development and Practical Application of Public Welfare Systems
[Key on following page]

[Key to Figure 2 on preceding page]

(1) Public welfare related
(2) Housing and urban related
(3) Production and construction system of the housing industry
(4) New transportation system
(5) New commodity flow system
(6) New information and communication system
(7) Environmental protection and disaster prevention system
(8) System to conserve energy with urban area machinery
(9) System to use sewage and drainage water through advanced cycling
(10) Medical, hygienics and welfare related
(11) Hospital automation system
(12) Regional medical information system
(13) Positive health care system
(14) A factory system for the aged and handicapped
(15) Education, training and culture related
(16) An advanced system for educational support through broadcasts
(17) Advanced CAT system
(18) Lifetime education and training system
(19) Related to the elevation of the food self-sufficiency rate
(20) System to produce protein from green leaves
(21) System to apply and develop dextrose production from cellulose material (biomass production)
(22) System to cultivate large size fish with floating rafts in the open sea (floating cage fish preserve)
(23) System to utilize hot water from power plants for agriculture and fishing
(24) Highly advanced production system for feed and farm produce
(25) Highly advanced system on use of the rice paddies (includes the second crop)
(26) System to convert animal excretion into fertilizer
(27) Food storage and distribution system
(28) (Chijo) industrial type food processing and distribution complex
(29) System on suitability and advanced development on new environment for industries
(30) Changes for resource conservation and saving energy
(31) Raw material switchover
(32) Manufacturing method switchover
(33) Energy switchover
(34) Design concept switchover
(35) Accommodation for a society for the aged
(36) Advanced robot system
(37) Advance the level of the black box system
(38) Accommodation for needs diversification
(39) Advance the level of the computer aided design system
(40) Advance the level of the system to produce many products in small quantities
(41) Advance the level of the automated assembly system
(42) Convert medium and high grade materials to CAM

(c) Promote the investments to users of the public welfare type systems.

(3) Strengthening the international type engineering capability. To strengthen the international type engineering capability, basically means gaining engineering

capability through the development of domestic projects on resources, energy and public welfare type systems and then undertaking international projects; however, executing the following measures along with the above will be effective:

(a) Promote engineering for economic cooperation. Furnish subsidies or commissions for engineering expenses, testing and research expenses, etc., which are necessary to develop improved tests and new techniques on the existing technology and for economic cooperation and technological cooperation suited to the needs of the serviced country.

(b) Promote international joint research agreements for public welfare type systems. Promote agreements that would contribute to the social development of Japan, the serviced country and other developing nations through joint development and practical application internationally of public welfare type systems which are applications of the latest space, aeronautical and communications technologies possessed by the advanced countries.

(2) Nurturing key personnel. Considered to be an intelligence-intensive and a knowledge-intensive industry, the engineering industry is one that considers key personnel as operational resources. Therefore, an essential subject is the nurturing of outstanding key personnel with ample experience and knowledge, excellent capabilities to perform operations and with a flair for international concepts. Key personnel, who are versed in all aspects of a project manager and a systems engineer and who can respond quickly to upgrading of projects to a larger scale, of international involvement, to increases in interdisciplinary public welfare type projects which is the trend recently, must be cultivated.

At present, training courses are offered at the Engineering Promotion Association to cultivate key personnel, but to achieve greater results, a study must be made to establish a training center that would offer training specifically for technicians engaged in engineering.

Besides considering the introduction of courses on the tax system as part of the education within the business firm, efforts must be made to supplement the engineering courses offered at the universities.

(3) Promote standardization of engineering. Considerable progress has been made in the standardization and normalization of hardware, but hereafter standardization of software especially must be undertaken, i.e. standardization of contracts, management documents, engineering terminologies, map indicators and symbols, etc. The Engineering Promotion Association has begun this task.

(4) Establish an appraisal standard for engineering. In order to establish a practice of a separate payment for hardware which is the engineering fee, a standard method of computing an engineering fee must be drawn up (the Engineering Promotion Association has already begun the task), an accounting method must be established and efforts must be exerted to spread the separate order system of engineering expenses in the event of a project involving the government and private business.

4. Future Outlook of the Engineering Industry

(1) Outlook on engineering demands

(1) Such prerequisites as the extent of growth of world trade, the extent of improvement in foreign currency holdings by developing nations and the balance of supply and demand of resources and energy for the 1980's are uncertain, the projects related to resources, energy, public welfare and urban development will turn big scale and more complex, and the engineering demands can be expected to steadily form an increased base.

(2) As for domestic engineering demands during the 1980's,

i) engineering enterprises related to energy are expected to increase sharply.

(a) Investments on petroleum storage will increase because further unstableness of the petroleum supply and demand balance in the 1980's is forecast.

(b) As energy sources to augment the shortage of petroleum supplies, investments on liquefied gas accompanying the increased use of LPG and LNG, investments on research and development on gasification and liquefaction technologies with coal (foreign coal included) and their practical application, investments on research and development on the technology to use heavy oil such as high (metaru) and high sulphur and their practical applications will increase.

(c) An increase in investments to develop oceanic petroleum from Japan's environs and coastal waters, and an increase in investments on research and development of seabed petroleum production system and its practical applications are predicted.

(d) Investments on nuclear power generation accompanying an increase in electric power demand, and on uranium concentrates, disposal system for radioactive waste materials, etc., will increase.

(e) Investments on sectional energy systems such as geothermal power generation, medium and small size thermal power, hydroelectric power plants, etc., will increase.

(f) Investments on large scale power transmission systems will increase because of stringent power demands and increasingly heavy unbalance in the supply and demand between sections are predicted.

ii) An increase in engineering projects related to public funds is expected.

(a) As for national land development and use, an increase in engineering projects is predicted because of the expected execution of large scale projects on building and construction of multi-purpose dam utilization systems, harbors, airports, highways, railways, etc.

(b) Investments on research and development and practical application of such public welfare type systems as environmental protection systems, water supply and drainage systems, medical welfare systems, transportation, commodities distribution system, information communication system, educational system, housing, urban systems, etc., which are for the maintenance and elevation of public welfare are predicted.

iii) The engineering activities related to processing plants for industrial raw materials production such as the petrochemical and steel manufacturing plants are expected to be reduced.

(a) Factors to be considered are that the above mentioned engineering activities have already reached a definite supply capacity, the availability of locations and space for any large scale complex is limited, new demands as obtained heretofore cannot be expected and the demand for pollution prevention plants that made a tremendous stride in the 1970's have already rounded their courses.

(b) It is considered that in the 1980's, rather than the new installation of facilities, the emphasis will be on the renovation or changing demand of existing plant facilities directed at saving energy and conserving resources.

(c) An increase in machinery and equipment production plants is expected, but at the present stage this phase is considered to be, not a part of the engineering industry, but that of equipment manufacturing.

iv) With the above factors considered, the domestic demand of the engineering industry in the 1980's will maintain the theme of expansion and growth, but it can be said that the tempo of expansion and growth cannot be expected to exceed that of the 1970's.

(3) Engineering demands abroad for the 1980's are:

i) Further increases in investments in production plants for oil producing countries and in national urban development are expected.

ii) An increase in investments on plants for resource development in resource possessing nations is expected.

iii) Seeking new markets in China, Africa and other countries is expected.

iv) Since developing nations strongly desire to be self sufficient with industrial raw materials, demands for medium and small size plants suited to meet their industrial needs can be expected.

v) Increase in investments for agricultural development, medical welfare systems, water supply and drainage systems for developing nations can be expected.

On the other hand:

i) A constantly favorable foreign exchange market or foreign currency situation in the different nations cannot be expected.

ii) The continuing political instability of developing nations during the 1980's is a possibility.

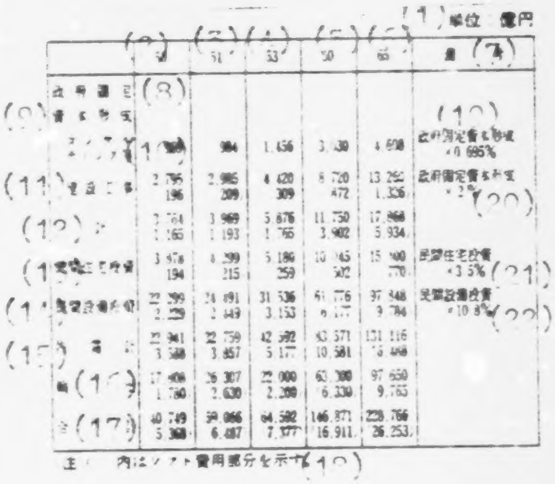
iii) As to the new markets in China and other nations, many restrictions exist on the conditions for payment on a plant order, and there are many unclear points on expansion of the market size.

iv) Uncertain factors, such as the possibility of the competition with the engineering businesses of Europe and the United States becoming intensified, must be considered.

However, despite these considerations, it is felt that the overseas engineering demands during the 1980's will continue to expand to a highly developed standard.

Table 1. Future Outlook on Japan's Engineering Industry

Key:
(1) Unit value=100 million yen
(2) 50=1975
(3) 51=1976
(4) 53=1978
(5) 60=1985
(6) 65=1990
(7) Remarks
(8) (9) Government's fixed capital formation
(10) consulting, etc.
(11) Building and construction
(12) Total
(13) Investments on private homes
(14) Investments on private facilities
(15) Domestic requirements
(16) Exports
(17) Total
(18) Note: Figures in parentheses indicate software costs
(19) Government's fixed capital formation x 0.695%
(20) Government's fixed capital formation x 2%
(21) Investments on private homes x 3.5%
(22) Investment on private facilities x 10.8%



(1) 単位 億円

	50 (2)	51 (3)	53 (4)	60 (5)	65 (6)	(7)
(9) (8)						(19)
(10)	[illegible]	984	1,456	3,430	4,598	×0.695%
(11)	2,795 196	2,985 209	4,420 309	[illegible] 472	13,292 1,336	×2% (20)
(12)	[illegible],764 1,165	3,969 1,193	5,876 1,765	11,750 3,902	17,868 5,934	
(13)	3,978 194	4,299 215	5,186 259	[illegible] 502	15,400 770	×3.5% (21)
(14)	22,599 2,229	24,491 2,449	31,536 3,153	61,776 6,177	97,348 9,734	×10.8% (22)
(15)	22,941 3,588	22,759 3,857	42,592 5,177	83,571 10,581	131,116 16,488	
(16)	17,808 1,780	26,307 2,630	22,000 2,200	63,300 6,330	97,650 9,765	
(17)	40,749 5,368	49,066 6,487	64,592 7,377	146,871 16,911	228,766 26,253	

注（ ）内はソフト費用部分を示す (18)

(Reference)

Using the forecasts from the government's fixed capital formation, etc., as basis, the trial balance of the scope of sales for the engineering industry shows that in 1978 the total sales, including procurement of machinery and equipment, construction, etc., was about 6.46 trillion yen of which the engineering portion or the software amount was 740 billion yen. (Table 1) Note that the upper figures indicate the total costs incurred beginning with basic designing, detailed designing, procurement of machinery and equipment to building and construction, and the figures in parentheses refer to software costs.

In 1985 the total sales is forecast to be 14.7 trillion yen and software, 1.7 trillion yen, and in 1990 the total sales is forecast to be 22.9 trillion yen and software 2.6 trillion yen.

Robot Industry

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6 Jun 80 pp 62-67

[Article by the Industrial Machinery Section, Machinery and Information Industries Bureau, MITI]

[Text] 1. Definition of Industrial Robot

The industrial robot possesses functions that can execute diverse movements in a 3-dimensional space and today it is defined as "a machine that can execute extremely free moving functions which resemble those of man's upper limbs (arms and hands) and that can act autonomously with sensual and perceptive functions."

The industrial robot is used primarily in the production process to control the arbitrary movements of objects, but it can also be equipped with tools to perform direct operations such as welding, painting and machinery processing. It can be automated for diversified small quantity production automation of which was difficult heretofore, and it has contributed to upgrading productivity, product quality and efficiency of facilities.

It has performed many roles in contributing to labor welfare and it has prevented labor disasters and occupational sicknesses from occurring by engaging in operations dangerous or rigorous to human beings or being under adverse environmental conditions because automation was difficult.

Hereafter, with technological improvements, the industrial robot will not only assume the motor functions of man's upper limbs, but also those of the lower limbs and those of such animals as the snake and crab.

The industrial robot can be classified into three kinds: the manual information and instructional, the sequential informational and the moving forms. (Tables 1, 2 and 3)

Types	Definition	Equivalent English
Manual manipulator	Man-operated manipulator	
Fixed sequence robot	Manipulator advances successively with each stage of movement in sequence, condition and locations which are fixed in advance; changes in fixed information cannot be made easily.	
Variable sequence robot	Manipulator advances successively with each stage of movement in sequence, condition and locations which are fixed in advance; changes in fixed information can be made easily.	
Playback robot	Man-operated and is fed instructions on sequence, locations and other information which, depending on the necessity, is recalled and followed by robot to complete assignment.	

[Table continued]

Types	Definition	English Equivalent
Numerical controlled robot	Manipulator performs assignment by following numerical instructions on sequence, locations and other information; e.g., perforating paper tape cards and using the digital switch,	
Intelligent robot	Robot determines actions through sensory or recognition functions.	

Note: The manipulator has functions similar to those of man's upper limbs (arms and hands) and can move assigned items through space.

Table 1. Types of Manual Information and Instructional Robot

Types	Definition	English Equivalent
Single purpose robot	Mechanism of manipulator has a fixed memory function. Remark: Cannot be converted to repeatable robot because of control device.	
Repeatable robot	Manipulator can repeat operations in accordance with work program stored in advance.	
Single programmed repeatable robot	The fixed program and work cycle program cannot be changed easily; e.g., programmed by cam and relay circuit.	
	* Variable program 1: Work cycle program can be easily changed and the control advances with the fixed sequence according to program; e.g., pin board and tape cards.	
	* Variable program 2: Program can be changed easily and during the cycle, per condition, it has the function to branch out. Note: general type sequence. Remark: Some of the robots with asterisks* have adaptable functions added on (functions to modify locations and sequence information).	
Multi programmed repeatable robot	It has several work cycles and can select cycle programs through the instructions program; e.g., minicomputer and general use sequence.	
Intelligent robot	Robot determines actions through sensory or recognition functions.	

Table 2. Types of Sequential Informational Robots

Types	Definition	English Equivalent
Cylindrical coordinates robot	Manipulator whose movements are primarily of the cylindrical coordinate form.	
Polar coordinates robot	Manipulator whose movements are primarily of the polar coordinate form.	
Caresian coordinates robot	Manipulator whose movements are primarily of the caresian coordinate form.	
Articulated robot	Manipulator whose movements are primarily in articulated arrangement.	

Table 3. Types of Moving Form Robots

2. History of Industrial Robot Development

The word robot was derived from a character in the play "Rossum's Universal Robot Manufacturing Co. RUR," written in 1920 by the Czechoslovakian playwright Karel Capek who was a fighting freedom-loving intellectual. Said character [robotit in Czech means to drudge] was a mechanical man.

The phrase "industrial robot" was first used in America by the newspaper American Metal Market in 1960, and the concept of the industrial robot was reportedly announced in America in 1954 by Geroge [sic] C. Devol in his patent application "Program Article Transfer" which expressed the concept of the playback robot, mentioned above in robot classifications.

Based on this patent, the Consolidated Control Corp. of America in 1958 announced its prototype which is considered to be the pioneer of industrial robot development.

The first Unimate and the (Bastoran), today referred to like synonyms for the industrial robot, were produced in 1962.

The first European industrial robot was made by the Kaufelt Co. of Sweden around 1963 when it announced that its first operational unit could compose programs.

In Japan the fixed sequence type industrial robot was already developed in the early 1960's; independent development and domestic manufacturing with introduction of foreign technology of the playback robot was begun in 1968; and the line-up of the principal industrial robot makers of Japan today was established by 1971.

Japan has about 140 industrial robot companies as compared to about 40 companies in Europe and the United States, and from the standpoint of numbers, state of research and development, and spread of industrial robot use, Japan has taken the world's leading role in the field of industrial robots.

3. Movements of the Industry

(1) Movements in production

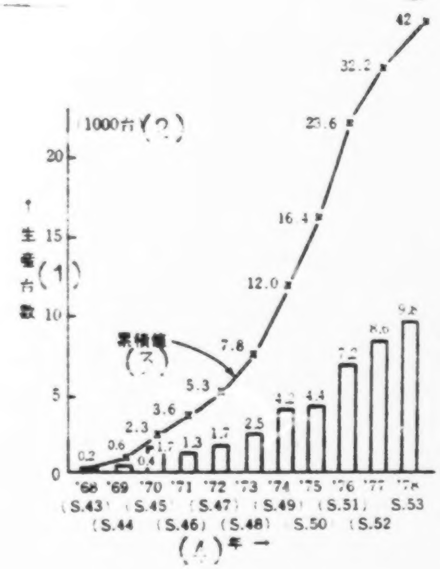
The playback robot was imported from the United States in 1967 and with the strong impetus received from this, Japan stepped up research and development to import industrial robots. Because of the drop in the economy and from problems with application technology in 1971, its production was at a standstill, but a turn for a quick upward swing took place in 1973. However, with the stagnation in capitalization of facilities caused by the economic recession from the oil shock in October 1973, the anticipated fast growth of industrial robot production never occurred.

The succeeding decline in economic growth caused a reduction in plans to invest in new facilities for increased production, but with the increase in investments to save power and to automate for upgrading productivity to cope against increased cost of living and higher wages, industrial robot production increased steadily in 1976. And although production increased steadily in this manner, the annual production in 1978 was 24.7 billion yen and this signified the first step in attaining the era of practical application. (Figures 1, 2 and 3)

Hereafter, the industrial robot production is forecast to rise sharply to fulfill the strong demands of upgrading productivity and labor safety for the industrial world, and the annual production amount for 1985 is forecast to be 290 billion yen according to the demand forecast made by the Japan Industrial Robot Industry Association and the Nomura Research Institute of Technology and Economics.

Figure 1. Annual Figures on Industrial Robots Produced

Key:
(1) Number of units produced
(2) Unit value=1,000 units
(3) Cumulative value
(4) Showa year designation (equivalents are also indicated)



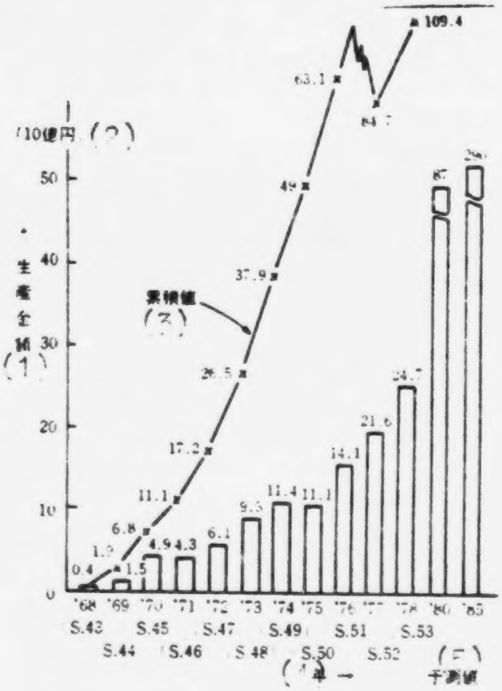


Figure 2. Annual Figures on Production Output of Industrial Robots

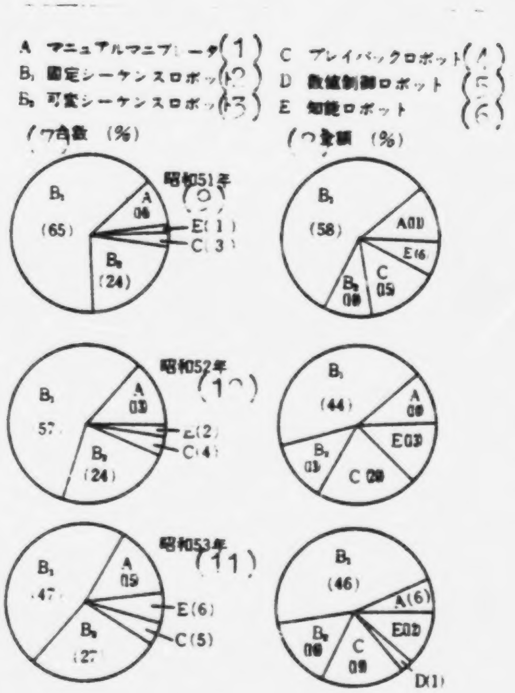


Figure 3. Production Percentages of Industrial Robots by Types and Year

Key:
(1) Production output (amount in yen)
(2) Unit value=one billion yen
(3) Cumulative value
(4) Showa year designation (equivalents are also indicated)
(5) Forecast value

Key:
(1) Manual manipulator
(2) Fixed sequence robot
(3) Variable sequence robot
(4) Playback robot
(5) Numerical controlled robot
(6) Intelligent robot
(7) Number of units by percentages
(8) Production amount by "
(9) 1976
(10) 1977
(11) 1978

(2) Movements in demand

The demand for industrial robots has spread throughout the entire industrial spectrum, but the principal demands in the various industries are: automobile industry (35 percent), electrical machinery and equipment manufacturing industry (25 percent), synthetic resin processing industry (8 percent), metal products manufacturing industry (7 percent), metal processing machinery manufacturing industry (5 percent), etc. (Figure 4)

The principal uses of the industrial robot in the various processes are cutting and grinding, pressing, resin forming, welding, die casting, heat processing and assembling.

Hereafter, such operations as tightening screws, assembly, caulking, etc. are possible with functions from an artificial "brain" operated by computer, and advancements in application in complex assembly operations and in inspection processes are forecast.

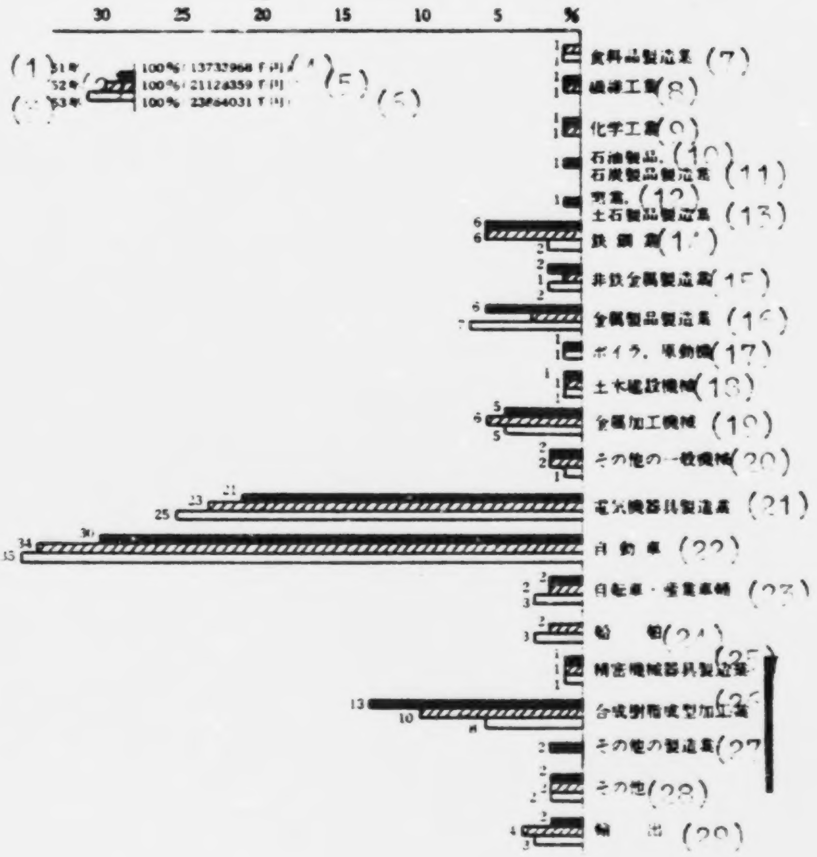


Figure 4. Demands of Industrial Robots in the Industries (expressed in perc ntages)

Key:

(1) Showa 51=1976
(2) Showa 52=1977
(3) Showa 53=1978
(4) 13,733,968 thousand yen
(5) 21,128,359 thousand yen
(6) 23,864,031 thousand yen
(7) Foodstuff manufacturing industry
(8) Textile industry
(9) Chemical industry
(10) Petroleum products
(11) Coal products manufacturing industry
(12) Ceramic industry
(13) Earthen and rock products industry
(14) Steel industry
(15) Non-ferrous metal manufacturing industry
(16) Metal products manufacturing industry
(17) Boiler and motors
(18) Building and construction machinery
(19) Metal processing machinery
(20) General type machinery
(21) Electrical machinery and equipment manufacturing industry
(22) Automobiles
(23) Bicycles and industrial vehicles
(24) Shipbuildings
(25) Precision machinery instruments manufacturing industry
(26) Synthetic resin mold processing industry
(27) Other manufacturing industries
(28) Others
(29) Exports

With the development of robots able to execute assembling operations, the demand in such industries as the electrical equipment manufacturing industry and general machinery manufacturing industry is expected to expand, and the demand for industrial robots which can be substituted for dangerous and rigorous operations and operations with adverse environmental conditions in the various industries will be greatly expanded.

(3) Movements in exports and imports

Since Japan is the leading nation in the world in the practical application of industrial robots, there is hardly any importing.

On the other hand, since there is emphasis on the development and use of this technology within Japan, exports are limited to 3-4 percent of the total production, but with the tremendous demand from the Western nations, USSR and the East European countries, it is estimated by 1985 the export ratio will be near 20 percent.

4. Promotion Measures for the Industrial Robot

Since its origin, the industrial robot has a very short history and the industry is an infantile one.

In Japan the industrial robot has taken its first step in the era of its full scale utilization. During this period, the industrial robot became a designated machine type with the "Emergency Measure Law for the Special Electronic Industry and Special Machinery Industry" enacted in 1971 and the "Emergency Measure Law to Promote the Special Machinery Information Industry" enacted and executed in July 1978, and by the early establishment of its industrial base, its growth and promotion were planned. The following promotional projects were considered to project its dissemination from this year:

(1) Industrial robot lease system. (Financing was advanced to establish the Japan Robot Lease Co., Ltd. in April 1980, as a lease company specializing in industrial robots.)

(]) Special repayment system for essential composite machinery. (Additional designation of the industrial robot for high performance electronic computer control.)

(3) Special financing system for industrial safety and health facilities. (Financing system used when small or medium enterprise purchases a labor saving industrial robot.)

(4) Capital loan system for modernizing facilities of small or medium enterprises. (Interest-free loan system used when a small or medium enterprise purchases an industrial robot.)

5. Problems from Standpoint of Using Industrial Robots

On the other side of the usefulness of the industrial robot lies the many restrictive conditions on importation of the industrial robot.

First, this does not apply to all the industrial robots, but there is a need to reappraise them for their economic value because of their high prices.

Second, systems engineering and the systems engineering business in Japan are not fully developed. A systems engineering optimizing the machinery system, which today has become multi-purpose, complex, highly developed and huge in size, is desired, and fostering an engineering business that would independently maintain business secrets is hoped for.

Third, heavy expenditures and much time would be required to develop technologies on industrial robot usage. And this would require considering the various ways and means to solve such problems as conditions required of the robot in terms of the type of machinery handled and its performance, accuracy of positional changes, cycle time, shape and weight of work handled, layout, differences in conditions of the environment, renovation of area so that the user can easily operate the industrial robot, such as on change of work facilities or layout change, etc.

Fourth, improve the reliability of the industrial robot; in other words, lengthen the interval between breakdowns.

Fifth, to optimize the system, Japan's long practiced tradition of ignoring to charge an engineering fee must be revamped.

Sixth, is the labor problem. Hardly any problems are encountered when installing robots in a newly built plant, but when installing in an established plant, the understanding of the workers must be obtained, a voluntary endorsement of the robots must be fostered and the workers must not be forcefully eliminated. While seeking a quality change of labor by installing the robots and having the workers be operators of the robots or be maintenance personnel, a reeducation program on the changes of roles must be instituted.

6. Outlook on the Robot Market

It is difficult to make a forecast with some degree of certainty on the future of the robot market because by nature it can be influenced by varying important factors. It is felt that big differences in forecast can occur depending on the cost of converting robot technology or robot-related technology to practical utilization; in other words, to the changes hereafter in cost performance and on the user's receptivity to such cost performance. For the present, while it is difficult to arrive at a quantitative assessment, the market forecast will undergo changes regardless of the influences of the cost performances from such indirect benefits as upgrading of product quality, elevating workmanship, increasing safety which are derivations of the robot system. Then from the medium and long range standpoint, the use of the intelligent robot will pose a big problem, but for the technological progress hereafter of the intelligent robot which has already reached the practical application level, the possibility of the formation of a large market is very likely to occur.

Next, the future of the several types of robots will be summarized:

(1) The simple loader/unloader type robot. A great deal of these robots have been imported to be used primarily with machine tools, pressing machines, plastic machines, etc. When considering the presence of a large number of these kinds of

machinery in Japan and the presence of machinery still without automation functions of loading and unloading during operations, and with no definite prospect of a competitive technology along automation, a stable growth hereafter is expected.

The possibilities of market expansion can be induced by the following:

(a) Use of robots with machinery (heretofore used with robots) which have not yet been automated. This is especially to increase its installation with machinery operated by small and medium enterprises.

(b) Expansion of the overseas market.

(c) Strengthening safety legislation.

(d) Technology to lower cost of unit; also, improvements in technology development.

(e) Occurrence of (replace?) demand.

The operations by the robots are comparatively simple and much of the operations are hazardous, to name a few of the merits of the robots whose performance can be given greater dissemination.

(2) Playback type robot. Because the minimum cost of a unit is 10 million yen, this robot is not cheap, but with such improvements as the introduction of the module design concept and installation of software support, its technology, beginning with welding and painting operations, has gradually expanded its scope of application. It is still a far cry from firming up the introduction of diversified small production processing, but with the sophistication of its high level functions such as addition of the sensor function, reduction of costs along with the dissemination of the modular robot which is dependent on the use of the standard unit, the practical application of a better diversified small quantity production processing will become a possibility. At the same time, this possibility is not totally limited to this robot type, but the development of hands that can grasp even softer objects to play a big role is expected.

(3) Intelligent robot. The influence that the intelligent robot can wield in the expansion of the entire robot market is forecasted to be tremendous. This type of industrial robot which uses pattern recognition as a means of recognizing information of the outside world can be applied first of all in high level assembling and inspection processes within the factory production line and successively it is possible to have the robot engage in various outdoor operations. In particular, the automation of assembling and inspection processes, when compared with machine processing, is relatively poorer in performances as a process and so the intelligent robot is said to have a big potential market.

(4) New Application Fields for the Robot. With the technological progress of the robot hereafter, especially with the progress of the technology of the intelligent robot as a prerequisite, the unfolding of many, new fields of application are anticipated. Some of the representative ones are given as follows:

(1) Application in the nuclear power related field. Use for various purposes such as the various handling operations in the nuclear power plant, the radioactive waste material processing stages, etc., checking plant conditions, periodic inspections, etc.

(2) Application in the medical and welfare related fields. Apply robot technology in the development of various systems, such as assisting the physically handicapped or the bedridden old person with his daily routine, assisting the nurses, making preparations for surgery, for firefighting, for rescue work, removal of dangerous matter, cleanup, etc.

(3) Application in the oceanic development related field. Robots to conduct various handling operations for the construction of underwater structures, underwater machinery processing, multi-purpose observation, etc.

(4) Application in agriculture and forestry. Applications of robot technology in agriculture and forestry, such as fruit harvesting, spraying agricultural chemicals, logging, pruning, gathering branches, etc.

(5) Application in construction. Apply robot technology for such operations as steel reinforcement framework, bridge painting, joining the outer and inner trimmings of a high rise structure.

(6) Application of robot technology in service industries is anticipated.

The progress of robot technology has possibilities in successive development in new fields as cited above.

Supplementary Funds

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6 Jun 80 pp 68-69

[Article by Koshin Kura of the Technology Promotion Section, Agency of Industrial Science and Technology, MITI: "On Decisions to Furnish Supplementary Funds for the 1980 Major Technological R&D"]

[Text] 1. The Subsidy System for Research and Development of Major Technologies

The purpose of this system is to foster research and development by granting subsidies for projects connected with the following research and development themes: on the major technologies which are expected to be the basis for promoting the conversion of Japan's industrial structure to a knowledge-intensive one; on housing systems technology; on hitherto unexplored innovative technologies which will be the basis for the innovative technologies of the next generation and will take the initiative to exert great influence, and on environment preservation, safety measure and energy saving technologies whose developments are urgently sought.

2. Summary of Applications for Grants

Applications for this year's grants were accepted from 1 February 1980 (Friday) with the announcement of an outline on grant applications and were closed on 29 February 1980 (Friday). The number of applications received was 137. (Table 1) The amount of money applied for was 5.7 billion yen.

3. Summary of the Screening of Grants

The screening was based on "The Outline of Screening Procedures for Granting Subsidies for Research and Development of Major Technologies," and the purpose was to actively select research and development projects with high technological standards and far-reaching lateral contributions, and especially considered essential from the standpoint of the nation's economic and social welfare.

As in the past, a deliberate and fair screening was first conducted in MITI and then the opinions of a "technical committee" composed of staff members of MITI departments and bureaus were solicited.

4. Summary of Candidates for Grants

From the screening described above, the list of grants was compiled as shown in "Data" on page 81. [Error for page 85. See Part C, this report for translation] A summary of the data follows:

(1) There are 54 grants with themes on core technologies and others. (Table 2)

(a) A total of 28 pertains to core technologies. The breakdown is: three in the machiney category, 17 in the electrical category, six in the chemical and textile category and two in the metals category.

Two of the subjects are "Research and trial manufacture of an intelligent, compound, automated measurement system utilizing LSI" and "Applied research on manufacture of diamond monocrystals for industrial use."

(b) A total of four subjects pertains to major technologies.

(c) A total of two subjects pertains to housing systems technology.

(d) A total of 20 subjects pertains to hitherto unexplored innovative technologies: two on optoelectronics, three on high level measurement, three on comprehensive utilization of carbon, six on utilization of enzymes and microorganisms, five on new materials and one on new electronic devices.

Two of the subjects are "Research on method of detecting temperature within the living body" and "Research on Josephson's integrated circuit."

(2) A total of 18 grants is made for environment preservation and safety measure technologies: 12 on environment preservation, namely air pollution prevention, water pollution prevention and waste disposal; six on safety measure technologies, namely industrial disaster and safety measures for machinery and tools relative to community safety.

Two of the subjects are "Industrial test of hermetically sealed type coal storage and handling facilities" and "Research and trial tunnel excavator."

(3) A total of 12 grants is made for energy saving technologies whose development is urgently sought. These are technologies on saving energy in production processes, saving energy in energy consuming machinery and equipment, on peripheral auxiliary machinery and tools, and on materials.

Two of the subjects are "Research and trial manufacture of a high efficiency engine using gas as fuel" and "Industrialization test on development of an energy saving ceramic heat exchanger."

(4) A total of 84 grants was made totalling 3,117,570,000 yen.

(5) The distinguishing characteristics of the 1980 subsidies for research and development of major technologies are: (1) an increase in the number of grants for research and development subjects which, being difficult for a single firm to carry out, are performed jointly by several firms or research associations (seven grants for joint research and three by research associations in 1978; eight for joint research and four by research associations in 1979; and 10 for joint research and five by research associations in 1980); (2) an increase in the number of grants for energy saving technologies and basic research technologies which are important from the standpoint of government policy (six grants for energy saving technologies and 19 for basic research technologies in 1979, and 12 for energy saving technologies and 20 for basic research technologies in 1980); and (3) an increase in the number of grants for large scale research and development (subsidies of over 100 million yen). There were three such grants in 1979 and four in 1980.

Table 1. Number of Applications and Grants

Classification		Number of Applications	Number of Grants
Core technologies and others	Core technologies	54	28
	Priority technologies	8	4
	Housing systems technology	3	2
	Hitherto unexplored innovative technologies	26	20
	Subtotal	91	54
Environment preservation and safety measure technologies		26	18
	Total	117	72
Energy saving technologies		20	12
	Grand total	137	84

Table 2. Number of Grants by the Trade and Industry Bureau

Classification		Sapporo	Tokyo	Nagoya	Osaka	Hiroshima	Fukuoka	Total
Core technologies and others	Core technologies	1	13	1	11	1	1	28
	Priority technologies			1	2	1	1	4 [sic]
	Housing systems technology		1		1			2
	Hitherto unexplored innovative technologies		14	2	1	2	1	20
	Subtotal	1	28	4	15	4	2	54
Environment preservation and safety measure technologies			12		5	1		18
	Total	1	40	4	20	5	2	72
Energy saving technologies			6		3	1	2	12
	Grand total	1	46	4	23	6	4	84

Development Plans

Tokyo KOGYO GIJUTSU in Japanese Vol 21, No 6, Jun 80 pp 83-92

[Text] B. Technological R&D in the Fields of Medicine and Welfare

A consignment system for technological research and development of medical and welfare equipment was inaugurated in 1976 with the government paying consignment expenses to agencies having the capabilities to undertake research and development of equipment whose development is newly requested in the medical and welfare fields. Results like those indicated below have already been obtained. An outline of the results obtained is presented below. Research and development of nine pieces of equipment are in progress at present.

	Automatic Hemogram Analyzer	Module-Type Electrically Driven Wheel Chair	Braille Reproduction Device
Outline of Development	Developed an apparatus that automatically analyzes hemograms by the pattern recognition method. Its accuracy is about the same as that for the testing technician (agreement rate over 95 percent) and has about 10 times greater processing speed (over 50 test objects/hour).	Planned to reduce costs by building components into modules and developed an electrically driven wheel chair that can be adapted to various degrees of handicap. Has an automatic control system, a bright design, a non-leaking fluid battery and other new features.	Developed a device that can read braille optically and reproduce one copy (braille typed on electrically driven typewriter) to several hundred copies (blister printed baille). At the same time, the device can easily do such things as convert braille to/from kana, edit, proofread and keep records
Principal Functions	Analysis items: Six classification of normal white blood cells, four classifications of abnormal white blood cells, detection of morphological and staining abnormalities of red blood cells. Preliminary processing device: Automatic smearing and automatic staining of 50 test objects.	Three models: The extremely handicapped, the severely handicapped and the slightly handicapped persons. Travel distance: About 20 km. Speed: 2 km/H to 6 km/H Weight: 55 to 70 kb. Climbable angle: 15° Surmountable step difference: 35 mm	Braille reading speed: 30 seconds per sheet. Reproduction time for one copy is about 3 minutes and reproduction time for many copies is 600 sheets per hour. There are three input methods: braille reading, kana and braille. There are two output methods: braille and kana.
Future Tasks	Accumulation of field data	Cost reduction	For dissemination abroad, make it possible to use both A and B editions

	Automatic Hemogram Analyzer	Module-Type Electrically Driven Wheel Chair	Braille Reproduction Device
Anticipated Price (varies with specifications and performances)	About 30 million yen	340,000 yen	The system: 7.8 million yen; manual typewriter: 50,000 yen and the electric typewriter: 70,000 yen
Destination of Disseminated Units	General hospitals, blood testing centers, health examination centers, etc.	Physically handicapped persons the aged, etc.	Blind persons, braille translation volunteers, braille libraries of schools for the blind, entrance exam centers of state universities, etc.
Number of Units Expected to be Dissimenated	1980-1984: about 150 units	Provided at public expense: About 600 units. Purchase by general public: About 800 units (annual number)	About 70 units of the system.
	Device for Training and Restoring Functions of the Physically Handicapped	Multi-function Bed for Severely Handicapped Persons	Multi-item Automatic Biochemical Analyzer
Outline of Development Results	Developed a system which optically analyzes at 16 points the walking patterns of persons not having free use of their limbs; with a large force plate also analyzes the shifting of the center of gravity. Also developed a device for measuring muscular strength.	Developed a multi-function bed for the severely handicapped who can defecate on the bed (electrically operated set chamber pot); can urinate on the bed (automatic detection and suction type separation bedpan) and can safely bathe on the bed with a simple bathtub.	Developed a high speed multi-item biochemical automatic analyzer capable of processing 300 test objects per hour and simultaneously analyzing 30 items. For high speed and low cost, new ideas on measuring are being considered.

	Device for Training and Restoring Functions of the Physically Handicapped	Multi-function Bed for Severely Handicapped Persons	Multi-item Automatic Biochemical Analyzer
Principal Functions	Capable of measuring a maximum of 16 points by semiconductor positional value detection sensors. Large force plate: 400 x 1,000 mmWo-100 Hg. 12 kinds of display software. A muscular strength measuring device adaptable to various kinds of handicap.	Disposal of defecation by means of an electrically operated set chamber pot; disposal of defecation by means of separation urinal; showering with a simple bathtub; an air type device to prevent bed-sore; an electrically driven mechanism for back raising and for up and down movements; weight: 123 kg.	Maximum number of items analyzed simultaneously: 30; processing capability: 300 test objects per hour; reaction section: (sheeto) method: amount of serum needed: 5-30 $\mu\ell$ per item; amount of reagent needed: 330-405 $\mu\ell$ per item; measuring methods: color comparison, UV and flame light.
Future Tasks	Upgrading the resolving power of the image detector method and converting it to subsystems.	System conversion and cost reduction to meet the requirements of a wide range of patients.	Accumulation of field data and development of a preliminary processing apparatus.
Anticipated Price (varies with specifications and performances)	Depending on system specifications: 2.5 to 7.5 million yen.	About 400,000 yen	About 30 million yen
Destinations of Disseminated Units	Hospitals, rehabilitation and treatment agencies for the physically handicapped	Hospitals, facilities for severely handicapped persons, special nursing homes for the aged, homes of bedridden old persons.	General hospitals, inspection centers, health exam centers, etc.
Number of Units Expected to be Disseminated	About 40 units of the system (in 5 years)	1980-1984: About 7,000 units	1980-1984: About 200 to 250 units

C. Supplemental Funds for 1980 Major Technological R&D

1. Core Technologies and Others (54 items)

(1) Core and Priority Technologies (32 items)

(Machinery Category)

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
1	Tokyo	Applied research	Research and Development of fluid transport device for solid fluid mixed flow	Niigata Iron Works	Core technology; 3rd year of 3-year plan
2	Tokyo	Research and trial manufacture	Research and trial manufacture of a comprehensive evaluation system for large antifriction bearings	NTN Toyo Bearing Co., Ltd. Koyo Seiko Co. Ltd.; Nippon Seiko Co., Ltd. Fujikoshi, Ltd.	Core technology; 3rd year of 3-year plan
3	Hiroshima	Industrialization test	Industrialization test on development of computer systems for clothing designs and for trial manufacturing processes	Asahi Chemical Industry Co., Ltd. and Okasen Co., Ltd.	
4	Nagoya	Applied research	Applied research on heat exchanger pipes for electric power generation utilizing ocean temperature differences	Sumitomo Light Metals Industries	
5	Osaka	Research and trial manufacture	Research and trial manufacture of an apparatus for tissue culture and cell fractionation	Miki Engineering Co., Ltd.	Core technology; 3rd year of 3-year plan; small and medium

(Electrical Category)

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
6	Tokyo	Applied research	Applied research on smart sensors	Adachi Electric Co., Ltd.	Core technology; 2nd year of 3-year plan
7	Tokyo	Applied research	Applied research on an integrated (Kaiseki) circuit using gallium arsenide field effect transistors	Fujitsu, Ltd.	Core technology; 3rd year of 4-year plan
8	Tokyo	Applied research	Applied research on laser gyro	Japan Aviation Electronics Industry, Ltd.	Core technology; 2nd year of 2-year plan
9	Tokyo	Applied research	Applied research on a recording medium for high density vertical magnetic recorder	Tokyo Shibaura Electric Co., Ltd. and Nichiden Aneruba Co., Ltd.	Core technology; 1st year of 2-year plan
10	Tokyo	Research and trial manufacture	Research and trial manufacture of an intelligent, compound, automated measuring system utilizing LSI	Automated Measuring Technology Research Association	Core technology; 1st year of 3-year plan
11	Tokyo	Research and trial manufacture	Research and trial manufacture of a high definition, liquid crystal display device	Takeda Riken Industry Co., Ltd.	Core technology; 2nd year of 2-year plan
12	Tokyo	Research and trial manufacture	Research and trial manufacture of a high definition, liquid crystal display device	Hitachi, Ltd.	Core technology; 3rd year of 3-year plan
13	Tokyo	Research and trial manufacture	Research and trial manufacture of a circuit breaking method for DC power transmission system	Tokyo Shibaura Electric Co., Ltd.	Core technology; 3rd year of 4-year plan
14	Tokyo	Applied research	Applied research on two-dimensional measurement of faint light	Hamamatsu TV Co., Ltd.	Core technology; 1st year of 3-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
15	Osaka	Applied research	Applied research on a high speed, high precision A/D switch for image processing	Matsushita Electrical Industrial Co., Ltd.	Core technology; 2nd year of 3-year plan
16	Osaka	Applied Research	Applied research on planar-type, high density color (three colors) LED display device	Sanyo Electric Co., Ltd.	Core technology; 2nd year of 3-year plan
17	Osaka	Applied Research	Applied research on a 500 KV series capacitor	Nisshin Electric Co., Ltd.	Core technology; 2nd year of 3-year plan
18	Osaka	Applied Research	Applied research on a color, liquid crystal matrix display	Hoshi Electrical Manufacturing Co., Ltd.	Core technology; 1st year of 2-year plan
19	Osaka	Research and trial manufacture	Research and trial manufacture of a superconducting (period phase adjuster)	Mitsubishi Electrical Corporation and Fuji Electric Co., Ltd.	Core technology; 4th year of 5-year plan
20	Osaka	Research and trial manufacture	Research and trial manufacture of a protein quantitative analyzer based on immunoelectrophoresis	Toa Medical Electronics, Co. Ltd.	Core technology; 2nd year of 2-year plan; small and medium
21	Osaka	Industrialization test	Industrialization test of high precision, large aperture SOS base plate	Kyoto Ceramics Co., Ltd.	Core technology; 1st year of 2-year plan
22	Hiroshima	Research and trial manufacture	Research and trial manufacture of an automated clinical test apparatus based on high speed liquid chromatography	Toyo Soda Co., Ltd.	Core technology; 2nd year of 3-year plan

(Chemical and Textile Category)

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
23	Tokyo	Applied research	Applied research on synthesis of a new polyimide from a new tetra-basic anhydride	Dai Nippon Ink Chemical Industry Co., Ltd.	Core technology; 2nd year of 3-year plan
24	Tokyo	Applied Research	Applied research on manufacturing enzymes for medical use from tissue culture	Asahi Chemical Industry Co., Ltd.	Core technology; 1st year of 2-year plan
25	Nagoya	Applied research	Applied research on atmospheric-pressurization sintering method for nitrogen silicon ceramics	NGK Spark Plug Co., Ltd.	Core technology; 1st year of 2-year plan
26	Osaka	Applied research	Applied research on manufacture of high grade, finely ground, nitrided silicon powder	Toyo Rayon Co., Ltd.	
27	Osaka	Applied research	Applied research on a method of manufacturing aromatic acetoxy-carbonic acid	Ueno Pharmaceutical Co., Ltd.	Small and medium
28	Osaka	Applied research	Applied research on composite materials reinforced with alumina fibers	Sumitomo Chemical Co., Ltd.	Core technology; 1st year of 2-year plan
29	Osaka	Applied research	Applied research on manufacture of diamond monocrystals for industrial use	Sumitomo Electric Industries, Ltd.	Core technology; 1st year of 3-year plan
30	Fukuoka	Industrialization test	Industrialization test on manufacture of polyester polycarbonate resin	Mitsubishi Chemical Industries Co., Ltd.	Core technology; 1st year of 2-year plan

(Metals Category)

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
31	Sapporo	Applied research	Applied research on non-ferrous metal clad sheet steel	The Japan Steel Works, Ltd.	Core technology; 1st year of 3-year plan
32	Osaka	Applied research	Applied research on manufacture of atomized iron powder for large sinters and forged sinter products	Sumitomo Metal Industries, Ltd.	Core technology; 2nd year pf 2-year plan
(2) Housing System Technology (2 items)					
33	Tokyo	Research and trial manufacture	Research and trial manufacture of a gas heat pump	Tokyo Gas Co., Ltd.	2nd year of 3-year plan
34	Osaka	Applied research	Applied research on a hybrid air conditioner	Matsushita Electrical Industrial Co., Ltd. and Daikin Kogyo Co., Ltd.	3rd year of 3-year plan
(3) Hitherto Unexplored Innovative Technologies (20 items)					
35	Tokyo	Hitherto unexplored innovative technology	Research on an optical element manufacturing technology based on a multifunction, molecular beam epitaxial growth apparatus	Ulvac Corporation	Optoelectronics; 2nd year of 3-year plan
36	Tokyo	Hitherto unexplored innovative technology	Research on materials for optical memory	Oki Electric Industry Co., Ltd.	Optoelectronics; 1st year of 3-year plan
37	Tokyo	Hitherto unexplored innovative technology	Research on a method of detecting temperature within the living body	Medical and Welfare Equipment Research Institute of the Technology Research Association	High order measurement; 1st year of 3-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
38	Tokyo	Hitherto unexplored innovative technology	Research on a high order measuring method applying visual functions of living body	Nippon Electric Co., Ltd.	High order measurement; 4th year of 5-year plan
39	Hiroshima	"	Research on monitoring of a living body by means of microsensors utilizing gate insulated field effect transistors	KURARAY Co., Ltd.	High order measurement; 2nd year of 3-year plan
40	Tokyo	"	Research on carbon fibers made from pitch	Nippon Carbon Co., Ltd.	Comprehensive utilization of carbon; 1st year of 2-year plan
41	Tokyo	"	Research on carbon membrane	Central Research Lab of Mitsubishi Metal Corporation	Comprehensive utilization of carbon; 1st year of 2-year plan
42	Fukuoka	"	Research on carbon fibers made from depolymerized coal	Mitsui Cokes Industry Co., Ltd.	Comprehensive utilization of carbon; 1st year of 3-year plan
43	Tokyo	"	Research on a method of identifying physiologically active substances by means of near infrared rays	Mitsubishi Chemical Industries Co., Ltd.	Enzymes and microorganisms; 2nd year of 2-year plan
44	Tokyo	"	Research on a method of measuring the constituents of a living body by means of enzyme sensors	Toyo Brewing Co., Ltd.	Enzymes and microorganisms; 1st year of 3-year plan
45	Tokyo	"	Research on function accelerating substances produced by microorganisms	Nippi Co., Ltd.	Enzymes and microorganisms; 1st year of 3-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
46	Nagoya	Hitherto unexplored innovative technology	Research on effective utilization of useful microorganisms by means of light quality	Nippon Carbide Co., Ltd.	Enzymes and microorganisms; 1st year of 3-year plan
47	Nagoya	"	Development of technology for separation and dispersion of constituents of a living body	Medekusu Co., Ltd.	Enzymes and microorganisms; 2nd year of 3-year plan; small and medium
48	Hiroshima	"	Development of a new cancer diagnosis system based on an enzyme method	Tokuyama Soda Co., Ltd.	Enzymes and microorganisms; 2nd year of 3-year plan; small and medium
49	Tokyo	"	Research on a method of generating super high pressure and on new materials applying this method	Inoue Japax Research Institute	New materials; 2nd year of 3-year plan; small and medium
50	Tokyo	"	Research and development of medical materials made of fluorine resin having (nishinsei)	Asahi Glass Co., Ltd.	New materials; 2nd year of e-year plan; small and medium
51	Tokyo	"	Research on an elementary shaped material made of alloy fortified by grain dispersion	Central Research Lab of Mitsubishi Metal Corporation	New materials; 2nd year of 4-year plan
52	Tokyo	"	Development of a composite membrane material possessing high weather resistance and high strength	Toyo Textile Co., Ltd.; Asahi Chemical Industry Co., Ltd.; Asahi Glass Co., Ltd.; Sumitomo Electric Industries, Ltd.; Teijin, Ltd.,; Toyo Rayon Co., Ltd. and KURARAY Co., Ltd.	New materials; 2nd year of 3-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
53	Osaka	Hitherto unexplored innovative technology	Research on high performance materials by means of plastic treatment	Sekisui Chemical Co., Ltd.	New materials; 1st year of 2-year plan
54	Tokyo	"	Research on Josephson's integrated circuit	Nippon Electric Co., Ltd.; Hitachi, Ltd.; Fujitsu, Ltd. and Mitsubishi Electric Corporation	New electronic device; 1st year of 4 year plan
2.	Environment Preservation and Safety Measure Technologies (18 items)				
55	Tokyo	Applied research	Applied research on the improvement of quality of resin molded products	Shinetsu Chemical Industry Co., Ltd.	2nd year of 2-year plan
56	Tokyo	Applied research	Applied research on a safety measure technology for medical care equipment	Medical and Welfare Equipment Research Institute of the Technology Research Association	1st year of 3-year plan
57	Tokyo	Industrialization test	Industrialization test on piston rings and cylinder linings in diesel engines for pollution prevention and energy saving	Nippon Piston Rings Co., Ltd.	2nd year of 2-year plan
58	Tokyo	Industrialization test	Industrialization test of heremetically sealed coal storage and handling facilities	Obayashi Gumi, Ltd.	
59	Tokyo	Industrialization test	Industrialization test of rubbing materials containing steel wool for automobile use	Akebono Brake Industry Co., Ltd.	2nd year of 3-year plan
60	Tokyo	Experimental	Trial manufacture for practical application of noise reduction of large trucks, etc.	Isuzu Motors Co., Ltd.; Nisson Diesel Industry Co., Ltd.; Hino Motors, Ltd. and Mitsubishi Motor, Ltd.	1st year of 3-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
61	Tokyo	Research and trial manufacture	Research and trial manufacture of high output klystron for treating industrial waste	Tokyo Shibaura Electric Co., Ltd.	2nd year of 3-year plan
62	Tokyo	"	Research and trial manufacture of a plasma surface treatment apparatus	Citizen Watch Co., Ltd.	2nd year of 2-year plan
63	Tokyo	Experimental and trial manufacture	Trial manufacture of a high strength turbine impeller based on precision casting	Ebara Manufacturing Co., Ltd.	1st year of 3-year plan
64	Tokyo	Research and trial manufacture	Research and trial manufacture on profiling control of a whole profile tunnel excavator	Sanwa Machine Parts, Co., Ltd.	Small and medium
65	Tokyo	Applied research	Applied research on an impression plate output technology based on electron beam scanning	Shaken Co., Ltd.	Small and medium
66	Tokyo	Applied research	Applied research on the manufacture of high aspect ratio mica flakes and high performance composite substances	Repuko Co., Ltd.	2nd year of 3-year plan
67	Osaka	Industrialization test	Industrialization test on the catalytic hydrogenizing decomposition treatment of organic chlorine compounds	Daido Oxygen Co., Ltd.	1st year of 2-year plan
68	Osaka	Research and trial manufacture	Research and trial manufacture of an optimum engine control system for energy saving purpose	Safety and Pollution Technology Research Association of Automobile Manufacturers	2nd year of 2-year plan
69	Osaka	Experimental	Trial manufacture of a safety automation system for finishing large castings	Kobe Steel, Ltd.	2nd year of 4-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
70	Osaka	Commermcialization development	Commercialization development of a dry type dust collector for blast furnace top gas	Kobe Steel, Ltd.	
71	Osaka	Applied research	Applied research on a new magnetic core material for electrical equipment	Matsushita Electrical Industrial Co., Ltd.	1st year of 3-year plan
72	Hiroshima	Applied research	Applied research on an oxygen enrichment system based on gas separation membrane	Teijin Limited;Asahi Glass Co., Ltd.; Sumitomo Electric Industries Ltd.; Toyobo Co., Ltd.; Toyo Rayon Co., Ltd.; Asahi Chemical Industry Co., Ltd., and KURARAY Co., Ltd.	2nd year of 2-year plan
3.	Energy Saving Technology (12 items)				
73	Tokyo	Applied research	Applied research on an instantaneous-starting, high efficiency miniature discharge lamp	Mitsubishi Electrical Corporation	2nd year of 2-year plan
74	Tokyo	Applied research	Applied research on energy saving with antifriction bearing production processes	NTN Toyo Bearing Co., Ltd.	1st year of 2-year plan
75	Tokyo	Industrialization Test	Industrialization test of a standard, practical electric automobile	Technical Research Association on Electric Cars for Standard Use	3rd year of 5-year plan
76	Tokyo	Industrialization Test	Industrialization test of a large reflecting mirror processing high weather resistance and high reflectance	NHK Spring Co., Ltd.	1st year of 2-year plan

No.	Classified by Trade & Industry Bureau	Types of Subsidy	Subjects	Recipients of Subsidies	Remarks
77	Tokyo	Research and trial manufacture	Research and trial manufacture of a (Ranking Botoming) engine	Komatsu Ltd.	1st year of 3-year plan
78	Tokyo	Research and trial manufacture	Research and trial manufacture of a room cooling, heating and hot water and supply system powered by gas engine	Komatsu Zenoa Co., Ltd.; Maekawa Manufacturing Co., Ltd. and Nagao Manufacturing Co., Ltd.	1st year of 3-year plan
79	Osaka	Applied research	Applied research on a heat driven engine utilizing a shape remembering alloy	Sharp Corporation	1st year of 2-year plan
80	Osaka	Applied research	Applied research on the development of an image display method using low power consumption CRT	Sanyo Electric Co., Ltd.	1st year of 3-year plan
81	Osaka	Applied research	Applied research on a dynamic pressure gas bearing for air cycle machines used in aircraft	Shimadzu Seisakusho Ltd.	
82	Hiroshima	Research and trial manufacture	Research and trial manufacture of a high efficiency engine using gas as fuel	Mitsui Shipbuilding and Engineering Co., Ltd.	1st year of 2-year plan
83	Fukuoka	Applied research	Applied research on a diesel engine made of ceramics	Kyoto Ceramic Co., Ltd.	3rd year of 3-year plan
84	Fukuoka	Industrialization test	Industrialization test on development of an energy saving ceramic heat exchanger	Kurosaki Refractories Co., Ltd.	1st year of 3-year plan

D. The Technological Advisory System

[by Akira Ito, Technology Section, Guidance Department, Agency of Small and Medium Enterprises, MITI]

1. Purpose of This System

The environment that has surrounded Japan's small and medium enterprises in recent years holds in it many problems--fierce competition from developing nations, diversification and elevation of consumer needs, an increase in restrictions to save resources and energy, etc.--that require immediate confrontation.

Japan's small and medium enterprises still occupy a firm position in the nation's economy, but if they are to develop soundly as the "forceful many" in the 1980's in such an environment, then it is imperative that stronger measures than before be taken to augment and strengthen their business resources so as to be able to cope accurately and quickly with the various changes in the environment.

Moreover, Japan's small and medium enterprises, to overcome these changes in the environment and to find their way out of future difficulties, must strengthen their technology development capabilities to develop new products and technologies, produce higher level products, obtain greater added values, reduce production costs, save resources and energy, etc.

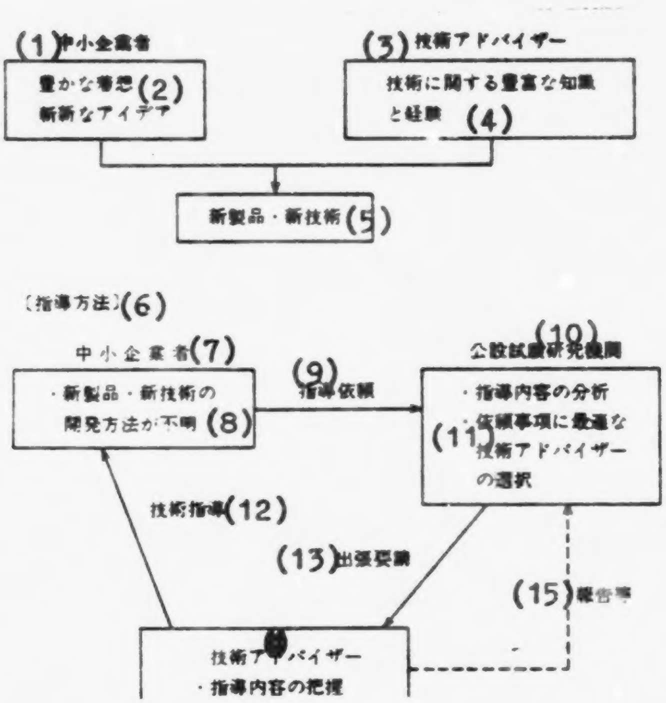
Although Japan's small and medium enterprises have continued with sustained efforts to strengthen their technology development capabilities, the present situation is one where they alone cannot execute because of such problems as shortage of technicians, inadequacy of facilities, insufficiency of funds for technology development and scarcity of technological information.

For these reasons, the Agency of Small and Medium Enterprises and the prefectural governments have instituted measures to furnish small and medium enterprises with technology guidance, assistance and support in technology development, technological training, technology information, etc., and are endeavoring to eliminate or alleviate restrictions so that small and medium enterprises can strengthen their technology developing capabilities.

The technological advisory system was established to plan for the healthy growth of small and medium enterprises by promoting their technology developing capabilities which have become even more important than before.

This system is to promote the development of new products and technologies by small and medium enterprises by drastically improving the technological advisory system which hitherto had been conducted mainly by public experiment or research agencies, such as the prefectural industrial experiment stations. Civilians possessing ample technological knowledge and experience in fields which small and medium enterprises require long term and individualized technological guidance to develop new products and technologies will be registered and stationed at the prefectures as technology advisers. They will give on request appropriate guidance to small and medium enterprises which, because of the lack of technology developing capabilities, are unable to translate their abundant concepts and novel ideas into the development of new products and technologies.

Technological Advisory System


(1) 中小企業者
豊かな着想 (2)
斬新なアイデア
(3) 技術アドバイザー
技術に関する豊富な知識
と経験 (4)
新製品・新技術 (5)
〔指導方法〕(6)
中小企業者 (7)
・新製品・新技術の
開発方法が不明 (8)
(9) 指導依頼
(10) 公設試験研究機関
・指導内容の分析
・依頼事項に最適な
技術アドバイザー
の選択 (11)
技術指導 (12)
(13) 出張要請
(15) 報告等
技術アドバイザー
・指導内容の把握

Key:
(1) Small or medium enterprise operator
(2) Abundance of concepts; novel ideas
(3) Technology adviser
(4) Abundance of knowledge and experience on technological matters
(5) New products and technologies
(6) Guidance method
(7) Small or medium enterprise operator
(8) Has no knowledge on developing new product or new technology
(9) Request for guidance
(10) Public experiment or research agency
(11) Analyzes request for guidance. Selects most suited technology adviser
(12) Technological guidance
(13) Request to have adviser dispatched
(14) Technology adviser; his grasp of the guidance request
(15) Reports, etc.

2. Outline of This System

Each prefecture will review the situation of the small and medium enterprises and the industrial development plans of the prefecture, and then determine the number of technology advisers to be registered and stationed. Generally about 20 technology advisers will be recruited in each prefecture.

To qualify as a technology adviser, one must (1) have over 20 years of actual experience in work related to technology matters, (2) be a professor or assistant professor of a natural science subject at a university, junior college or higher technical school, (3) have received a doctor's degree for research on a natural science subject, (4) have over 8 years of actual experience as a technician in technological work or have sufficient expert knowledge and experience to give technological guidance to small and medium enterprises.

Persons selected with these criteria will be commissioned as technology advisers by the prefectural governor.

The technology adviser will provide technology guidance in accordance with the technological level of the small or medium enterprise requesting guidance at the production site, the public experiment or research agency (open laboratory), etc.

Guidance by a technology guidance can be obtained continuously. When developing a new product, advice can be obtained stage by stage from concept planning, designing, trial manufacturing to commercial production. Normally an enterprise can receive guidance on an average of five times a year, up to a maximum of ten times.

Furthermore, guidance given by a technology adviser will, as a rule, be free.

Guidance requests from small and medium enterprises will be cleared through a technological advisory office established at the prefectural commerce and industry section or the public experiment or research agency. The prefectures will ask the central committee of the Small and Medium Enterprises Association, Chamber of Commerce, business organizations, the Subcontracting Enterprises Promotion Association and other related small and medium enterprise organizations to cooperate with the system in such matters as its popularization, education, and in assisting small and medium enterprises to seek technological guidance.

The plan is to inaugurate the technological advisory system in July 1980.

Persons desiring details about the technological advisory system or desiring guidance from a technology adviser can apply at the agencies mentioned above.

9510
CSO: 8129/1497

TESTS OF APR-4 WARNING SYSTEM START ON C-1 TRANSPORT

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 6-7

[Text] Airborne tests of a prototype XJ/APR-4 radar warning system for the F-15J started on a C-1 transport early in November as Tokyo Keiki Co., the prime contractor for development and production of the system, completed fabrication of two prototype sets. Another prototype will be used for reliability and other tests.

The TR&DI ordered the two prototypes in FY 1978 when the JDA placed the first APR-4 order with the firm to cover 23 F-15J and DJs.

A ¥26,221,000 contract was given to KHI in FY 1979 for modification of a C-1 to accommodate the test-model APR-4 system. The C-1 belongs to the first transport squadron of the ASDF Air Transport Wing.

Airborne tests at the Air Proving Wing will last until the end of February 1981.

The TR&DI will also hand a ¥4,598,000 contract to KHI shortly for restoration of the C-1 to its original state after the airborne APR-4 tests. Restoration will be carried out at KHI's Gifu Works from March 1 to 20 next year, and then the C-1 will be returned to the first transport squadron.

CSO: 4120

SCIENCE AND TECHNOLOGY

TR&DI TO TEST 120MM GUN FOR NEW MBT IN LATE NOVEMBER

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 p 7

[Text] The TR&DI will conduct technical evaluation tests in late November on a 120mm smooth bore gun and its ammunition for a new main battle tank (MBT) being developed.

The tests are expected to pave the way for final adoption of the domestically developed gun and ammunition, although some quarters have recommended selection of Rheinmetall GmbH's 120mm smooth bore gun for the MBT. The West German gun is used on the US Army's XM-1 tank.

If the domestic gun and ammunition pass the tests, their full-size fabrication will start in FY 1982.

The gun's barrel for the tests has been built by Japan Steel Works Ltd. and the ammunition by Daikin Kogyo Co. and Komatsu Ltd.

CSO: 4120

MITI INAUGURATES STUDY GROUP ON SPACE INDUSTRY

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 7-8

[Text] The Ministry of International Trade and Industry (MITI) last week inaugurated a study group on basic issues related to space industry. The group headed by Prof. Hiroshi Hirayama of the Faculty of Science and Technology, Waseda University, will study the problems and prospects which the Japanese space industry is presently facing, the position of the industry in the present Japanese economic setup and measures to help promote it. The group will compile a report and recommendations by the end of this fiscal year, or the end of March 1981 and submit them to MITI's Aircraft and Machinery Industry Council for study.

Japan's space technology depends almost completely on foreign countries, and its market is very limited. Sales of the space industry here totaled ¥105,400 million in FY 1978. Of this amount, ¥53,800 million was for rockets, satellites and related products, and ¥47,000 million for ground communications equipment. Exports during that year totaled ¥23,600 million, about 97 percent of which was for ground support equipment.

Developing countries, especially those in Southeast Asia, have been increasing their space activities. ASEAN countries are reportedly studying joint use of communications and other satellites, MITI sources say.

The newly inaugurated study group is expected to study measures to help promote the Japanese space industry, especially to meet requirements on broadcasting, communications, weather observation and search of earth resources, the sources say.

CSO: 4120

NASDA DRAFTS H-1 ROCKET SPECIFICATIONS

Tokyo JPE AVIATION REPORT-WEEKLY in English 3 Dec 80 pp 8-9

[Text] The National Space Development Agency (NASDA) has drafted specifications of the H-1 three-stage rocket for launching application satellites in the decade starting in 1985, and assigned Nissan Motor Co. to develop the third stage booster which is the most important.

Nissan has started research and development on components of the third stage booster. Full-scale development is planned to begin around 1982.

According to the specifications, the third stage booster must produce an average vacuum thrust of eight tons in order to launch a satellite weighing around 550 kilograms.

The booster will measure about two meters in length and 1.33 meters in diameter. It will weigh around two tons, including 1.85 tons of propellant.

Although Nissan has so far used carboxyl terminal polybutadiene (CTPB) for a composite solid propellant for Tokyo University's M rockets, hydroxyl terminal polybutadiene (HTPB) will be adopted for the H-1 to increase combustion efficiency. This is Japan's first application of HTPB as a rocket propellant. Nissan has started combustion tests to confirm the feasability of HTPB.

EPDM ethylene-propylene rubber will be used as an insulator between the motor and propellant for the first time. This material is lighter than synthetic rubber which has so far been used.

The motor's case will be made of highly reinforced titanium alloy with fair heat resistance to lighten the third stage. The case's average thickness will be only two to three milimeters. For the nozzle, carbon fiber reinforced plastic or other new composite materials will be adopted.

Nissan will give priority to reducing weight of the third stage because this stage has the greatest effect on the weight of a satellite.

The first test H-1 rocket comprising two stages will be fired at Tanegashima Space Center in the winter of 1986 and the first three-stage rocket in the winter of 1988. Nissan will adjust its H-1 rocket program to meet the test firing schedule of NASDA.

CSO: 4120

SCIENCE AND TECHNOLOGY

GOVERNMENT TO IMPORT H-1 ROCKET PARTS FROM U.S.

Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 9-10

[Text] Japan will import some parts and materials of the H-1 rocket under domestic development from the United States on condition that it can use the US Space Shuttle for launching application satellites which the H-1 cannot cover.

This has been broadly agreed upon between the two, according to government sources. Notes to this effect will be exchanged shortly.

The agreement has solved a major problem involving H-1 parts and materials, laying the groundwork for a smooth H-1 development program, according to space development sources.

The H-1 which will succeed the N rocket is designed to launch application satellites larger than previous experimental satellites. Its second stage booster will use an engine burning liquid oxygen and hydrogen fuels.

Although Japan intends to develop second and third stage boosters and an inertial navigation system on its own, parts and materials corresponding to 10 percent of the total cost will have to be imported from the United States.

The government negotiated the deal with Washington over the past year. Japan's use of the Space Shuttle was proposed by the US in an apparent bid to check West Europe's drive for this country's utilization of the Ariane rocket under development. Japan accepted the proposal in exchange for US approval of the import.

CSO: 4120

JDA TO FABRICATE ADVANCED ROTOR SYSTEM IN FIVE YEARS

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 8

[Text] The JDA will start research during the current fiscal year on an advanced helicopter rotor system including composite material blades and a new hub.

It has already ordered a wind tunnel model of the rotor system valued at ¥51,492,000 from Kawasaki Heavy Industries Ltd. (KHI). Delivery is scheduled for March 31, 1981.

Fabrication of a complete rotor system for actual mounting on a helicopter is expected to take five years, including FY 1980.

The advanced rotor system is designed to improve helicopter performance. Composite materials have already been used in blades of some helicopters for US forces. Although the composite material blade has little effect on weight, its strength can boost kinematic characteristics. The composite blade is also more durable than conventional blades.

As to military use, bullets can pierce the composite material blade without cracking it.

CSO: 4120

ADOPTION OF GUN FOR MBT DEPENDS ON TEST RESULTS

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 9

[Text] Adoption of the TR&DI's 120mm smooth bore gun and APDSFS ammunition for a new main battle tank (MBT) will depend on results of technical evaluation tests conducted in late November.

The TR&DI has fabricated and tested the 120mm gun in consideration of the GSDF's MBT requirements. If the test results, now under study, reveal success of the gun and ammunition, full-scale development will start in FY 1982 with completion planned for FY 1988.

If the TR&DI fails to prove by the end of FY 1980, however, a foreign gun will be introduced as the main gun of the new MBT.

A promising foreign condidate for the main gun is Rheinmetall GmbH's 120mm smooth bore gun, which is mounted on the US Army's XM-1 tank.

CSO: 4120

JDA TO PROCURE SOFTER-RECOIL GUN COMPONENTS IN FY '80

Tokyo JPE AVIATION REPORT-WEEKLY in English 17 Dec 80 p 9

[Text] JDA's Central Procurement Office has decided to order a sighting system and a chassis for a self-propelled softer-recoil gun under research from Japan Steel Works Ltd. and Komatsu Ltd., respectively.

About ¥430 million is contained in the FY 1980 budget for fabrication of the two components. Of this about ¥250 million is for the sighting system and about ¥170 million for the chassis, according to informed sources. However, there is a gap between the amount and the two companies' estimates. Therefore, necessary coordination is expected to delay formal contracts until early next year.

The self-propelled softer-recoil gun is designed as an antitank weapon for the GSDF. Fabrication in the current fiscal year is based on past research.

Fabrication is aimed at obtaining technical data before mounting a 105mm SR gun on the chassis.

The gun is being tested on the chassis of a Model 74 105mm self-propelled howitzer. Following fabrication in the current fiscal year, tests and full-scale development are expected to start in FY 1981.

CSO: 4120

BRIEFS

DEVELOPMENT OF SOUND LOCATOR--The Technical R&D Institute (TR&DI) of the JDA is expected to start technical development of a LQO-4 submerged fixed sound locator for antisubmarine surveillance for the Maritime Self-Defense Force (MSDF) in FY 1982 after final test fabrication in FY 1979. It intends to prepare performance requirements by the end of FY 1980 or March 1981. The LQO-4 sensor will replace the existing LQO-3 for coastal and port submarine surveillance. Procurement of LQO-3 sensors was suspended in FY 1975. Research on the LQO-4 started under the 1967-71 Third Defense Buildup Program. As the MSDF demanded improved operational ability, the TR&DI fabricated a submerged subsystem for further research from FY 1978 and a display device for multiple underwater targets in FY 1979. Basic research has now been completed, paving the way for technical development. Funds for technical development are expected to exceed ¥2,000 million. Research funds in FY 1978 and 1979 totaled about ¥1,000 million. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 pp 8,9]

JET ENGINE FOR NEW SSM--The TR&DI started tests of a prototype jet engine for a new surface-to-surface missile (SSM) at its Third R&D Center in November. the initial stage of the ongoing running tests has produced satisfactory results. The prototype engine was delivered to the TR&DI by Mitsubishi Heavy Industries Ltd. (MHI) in September. Although the new SSM is based on the ASM-1 antiship missile designed for the F-1 support fighter, a jet engine is adopted instead of the ASM-1' solid fuel rocket to increase cruising range. Operational requirements of the jet powered engine are different from those of jet aircraft engines. Since a missile engine is only used once, the engine must be simplified to reduce cost. It also must be ready for firing at any time even without maintenance. The TR&DI ordered two prototype engines and a complete missile design from MHI in FY 1979. Following the engine for the ongoing tests, another will be delivered by the end of this year. In the current fiscal year, TR&DI will place orders with MHI for a guidance system and an inertial navigation system as well as additional engines. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English 10 Dec 80 p 9]

CSO: 4120 END

JPRS 78917

8 September 1981

Japan Report

No. 133

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 78917

8 September 1981

JAPAN REPORT

No. 133

CONTENTS

SCIENCE AND TECHNOLOGY

Outline of Energy Conservation Tax System
(SHO-ENERUGI SETSUBI NO TOKUBETSU SHOKYAKU SEIDO, 10 Feb 81)...... 1

Progress of National Petroleum Stockpile Projects Reviewed
(Tokuzo Ikeda; TSUSAN JANARU, Jul 81)........................... 24

SCIENCE AND TECHNOLOGY

OUTLINE OF ENERGY CONSERVATION TAX SYSTEM

Tokyo SHO-ENERUGI SETSUBI NO TOKUBETSU SHOKYAKU SEIDO in Japanese 10 Feb 81 pp 1-21

[Chapter 1. Outline of Energy Conservation Tax System by Energy Conservation Measures Division, Natural Resources and Energy Agency]

1-1 Establishment of the Special Depreciation System for Energy-Saving Equipment

[Text] Better and more complete energy policy being the national goal, Japan established in 1978 a special depreciation system for energy-saving equipment as one means for promoting energy conservation in industry, which is responsible for nearly 60 percent of total energy consumption.

1-2 Special Depreciation System for Energy-Saving Equipment

(1) Outline of the Special Depreciation System for Energy-Saving Equipment

Items covered by the special depreciation system for energy-saving equipment are; "machinery, newly developed or considerably upgraded in order to make a substantial contribution toward promoting effective use of not fully used energy and cutting back energy consumption, and other depreciable property which needs immediate installation. Special depreciation is recognized as an exceptional case of depreciation under the provisions of the Special Taxation Measures Law. When an enterprise acquires certain depreciable property, a certain percentage of this cost is depreciated in addition to the regular depreciation for the first year only. The total amount of depreciation does not change, but the increase in expenses or addition to losses that results from it in the first year lowers the amount taxed, therefore postponing the taxation for that amount.

The special depreciation system covers various items depending on the purpose. Specific industrial equipment whose installation should be promoted for policy reasons is covered in the special depreciation for specific equipment under Article 11 (an exception to the Income Tax Law in the case of an individual) and Article 43 (an exception to the Corporation Tax Law in the case of a corporation) of the Special Taxation Measures Law. Energy-saving equipment falls in this category and special depreciation is allowed in the first year, up to 20 percent of the acquisition cost. A summary of this follows.

1) Eligibility

Individuals or corporations that operate a business and who submit tax form printed in blue are eligible. The term "corporation" includes corporate aggregates that "have no personality" as stated in the Corporation Tax Law, that is either a corporate aggregate or a juridical foundation, which is not a corporation, and that has a designated representative or a manager.

2) Eligible Equipment

This system is applicable to equipment designated in Chart 5 of Notification No 69 of the Ministry of Finance issued on 29 May 1973. (Partly revised Notification 30 of the Ministry of Finance issued on 31 March 1980). It is limited to new equipment which was acquired, manufactured or used for business within the designated period of time indicated in the time column of the list. Equipment being rented out is excluded.

The definition of "acquired, manufactured or used for business: as stated in the Articles 11 and 43 of the Special Taxation Measures Law can be interpreted as follows.

In the case of purchased property, acquisition occurs at the time of the normal "transfer of ownership." The time of ownership transfer will be decided case by case according to the contract. In the case of property either manufactured or constructed, acquisition occurs when the construction or the manufacturing process is complete.

Its "use for business" takes place when the actual operation starts in accordance with its intended use and method for operation. However, this will be judged on an individual basis according to the nature of the equipment, the conditions of delivery stated in the purchase agreement and other circumstances.

For example, let us say some equipment is purchased under the condition that actual delivery will take place only after the completion of a test drive. When the machine is operated for testing, since the delivery theoretically has not taken place yet, it is not being used for business. However, "used for business" does not necessarily mean that a product is actually manufactured as a result of its operation. Therefore each case is dealt with individually as stated previously.

It is also applicable to cases when the equipment is being used while the payment has not been made at once and the ownership is being suspended as in the case of testing or rental.

3) Limit on Depreciable Amount

Maximum depreciable amount is earned by multiplying the purchase price by 20/100, the special depreciation rate prescribed in relation to the energy-saving equipment, and can be depreciated in addition to the regular depreciation of the first year.

4) Applicable Time Period

Applicable to the calendar year or business year, which includes the date specific equipment was purchased and used, provided the date falls within the designated time period prescribed in Chart 5 of the Notification of the Ministry of Finance.

When a deficit occurs, a carry over of 2 years for a corporation and 1 year for individuals is allowed.

5) Application Procedure

When filing a tax report, prepare a detailed statement relating to special depreciation of specific equipment and attach it to the final return form (kakutei shinkokusho). (Special Taxation Measures Law-Article 11, Paragraph 3, and Article 43, Paragraph 2). In addition to that, an individual filer should make entry related to the inclusion into expenses. (Special Taxation Measures Law-Article 11, Paragraph 3).

Furthermore, it is advisable to keep a catalog that will help prove the specifications and quality of the acquired equipment, or other records such as details of delivery, in order to ease and expedite tax investigation at a later date.

As will be explained in Chapter 3, for energy-saving equipment, related business organizations of equipment manufacturers and installers have established a "system to prove specifications and others of energy-saving equipment." Proof of specifications attached to the acquired equipment based on this system should be handed in with the tax form.

And since aforementioned proof will be used as a reference at the time of a tax investigation, a copy should be made and kept.

6) When Other Systems Can Apply

When a part or a whole of the applicable equipment falls into more than 2 categories covered in the special depreciation system for specific equipment, the one with the larger depreciation rate (partial application allowed) should be used.

This program does not apply to equipment eligible for special depreciation under different programs such as programs for industrial equipment for underdeveloped areas or equipment for small and medium sized businesses.

(2) Calculation of the Amount of Depreciation

The amount of depreciation for energy-saving equipment can be obtained by multiplying the acquisition price by 20/100 and can be specially depreciated in addition to the regular depreciation the first year.

1) Acquisition Price of the Equipment

Acquisition price of the equipment, the basis for calculating the amount of depreciation, can be obtained through the following procedure. When more than 2 pieces of equipment are acquired, the sums should be totaled.

1. When purchased: (Total of a and b)

a) Purchasing price, including transport fee for delivery, labor, moving insurance fee, handling fee, tariff and other pertinent expenses added.

b) Amount directly needed to make the equipment serviceable.

2. When manufactured or constructed: (Total of a and b)

a) Cost of raw materials, labor and other expenses needed for construction/manufacturing.

b) Amount directly needed to make the equipment serviceable.

Property to which special exception to reduced value entry (reduced value entry bookkeeping in the case of expropriation, replacement of certain equipment, and in cases related to subsidies for change or termination of business) has been applied is not covered by this special depreciation program.

In the case of corporations owning property to which reduced value entry bookkeeping was applied to, as prescribed in the Corporation Tax Law (as in the case of reduced value entry for fixed property acquired with the aid of National Treasury Subsidy), there is no specific ordinance prohibiting the overlapping application of this system. However, in this case, the amount added into the amount of loss in reduced value entry bookkeeping should be deducted from the acquisition amount obtained following the above procedure. (1 and 2) (The Corporation Tax Law-Enforcement Ordinance-Article 54, Paragraph 3).

2) Calculation of the Amount of Depreciation

1. Corporations:

Corporations that file a blue-printed tax form (aoiro shinkoku) can choose from practically 2 methods of accounting; the direct method or the indirect method. Following is an example of a computation method.

Example:

Name of Corporation: Kasumigaseki Paper Co.

Business Year: 1 April 1980 to 31 March 1981

Equipment Acquired: Boiler using waste heat (applied to "other equipment for manufacturing paper products" from the 2nd Chart No 70 of Ministerial Ordinance related to the number of years of durability for the depreciable property. The legal years of durability is set at 10 years).

Acquisition Price: 20,000,000 yen.

Date Acquired: 1 June 1980.

Date operation started: 1 July 1980.

A) Direct Method

a. Fixed Rate Method

Amount of regular depreciation for the acquired equipment
= acquisition price x fixed rate method depreciation rate x number of months
= 20,000,000 x 20.6% x 10/12 = 3,433,333 yen ----------A_1

Amount of special depreciation
= acquisition price x 20/100
= 20,000,000 x 20/100 - 4,000,000 yen ---------------B_1

$A_1 + B_1$ = 3,433,333 yen + 4,000,000 yen

= 7,433,333 yen

7,433,333 yen is the amount of depreciation on energy-saving equipment for the term including March of 1981.

When there is a deficit in B_1, that is when the entire amount was not depreciated by March of 1981, the difference, after clearly figured out, can be carried over and depreciated during each term up to March of 1984. Total of A_1 and B_1 and the amount of deficit will be calculated separately for each piece of equipment.

b. Fixed Amount Method

Amount of regular depreciation for the acquired equipment
= (acquisition price - remaining amount) x fixed amount method depreciation rate x number of months
= (20,000,000 - 2,000,000) x 10% x 10/12
= 1,500,000 yen ------------------------------A_2

Amount of special depreciation
= 4,000,000 yen ------------------------------B_2

$A_2 + B_2$ = 1,500,000 yen + 4,000,000 yen

= 5,500,000 yen

5,500,000 yen is the amount of depreciation for the term including March of 1981. Deficit in B_2 amount is treated as in the fixed rate method.

B) Indirect Method (Reserve Method)

Generally, for regular depreciation of depreciable property, it is a requisite of tax law to account it as loss in that business year.

However, because of its nature, entry to loss in the case of special depreciation is not necessarily in accordance with business reality. Therefore it should be placed in the books as a depreciation reserve or as a certain amount set aside from profits. Based on this, "Special Depreciation by Reserve Deposit Method" was adopted. (Special Taxation Measures Law-Article 52-3).

This allows one to set aside an amount less than the maximum of special depreciation in installments as reserve which will be off set by including it into profit equally during 7 years following the next term. The actual computation procedure is as follows.

Amount of regular depreciation
= same as the direct method
= 3,433,333 yen (fixed rate method)
= 1.500,000 yen (fixed amount method)

Amount of special depreciation
= same as the direct method
= 4,000,000 yen

This amount should be calculated into losses through a completely different channel of accounting from depreciation. (When a certain amount is set aside from profits, it has to appear in the column of income loss in Chart 4 of Tax Report Form.)

The following describes the accounting procedures for the term of March, 1982 using the reserve method. Even when a fixed rate is used, the value in the ledger is not reduced. The maximum amount for regular depreciation is figured out and the equivalent of 1/7 of the reserve for special depreciation is added onto profits.

Amount of regular depreciation

fixed rate method = (20,000,000 yen - A_1) x 20.6% = 3,412,733 yen

fixed amount method = 18,000,000 yen x 10% = 18,000,000 yen

Amount offset in special depreciation

= reserve for special depreciation x number of months in the business year x 1/84

= 4,000,000 x 12 x 1/84 = 571,428 yen ----------------(added to profits)

571,428 yen will be added to profits during 7 years (7 terms) after the term that includes March, 1980.

As in the direct method, 3 year carry over is allowed in case a certain amount of the reserve is left over. In actual practice, since each term will produce some special depreciation reserve deposit, it is necessary to make clear distinction of the business year when accounting for it. (Tax Statement Form 16-6)

When following cases take place, the special depreciation reserve will be added to profits.

a. When terminated because of merger

> Of the amount of special depreciation reserve, the amount which was not given over to the merger partner on the day of the merger.

b. When the amount of special depreciation reserve was dissolved on purpose. An amount equivalent to the amount dissolved on that particular day.

2. Individuals

Individuals submitting the tax form printed in blue can add into expenses the total amount of regular depreciation and the maximum amount of special depreciation when calculating the business income of the business year that includes the date when energy-saving equipment came into service.

The procedure to figure out the amount is the same as the direct method for corporations. However, the amount of the deficit can be carried over and depreciated during the following 2 years. (not 3 as for corporations)

(3) Reporting Procedures

Corporations have to file Form 16, a detailed statement explaining the calculation of the amount of depreciation for depreciable property (when using the fixed amount method, submit 16-1, fixed rate method, submit 16-2, and the reserve system, submit 16-6) with their final tax return. For specific equipment such as energy-saving equipment, in addition to the detailed statement (Form 16), a statement regarding the calculation of the maximum amount of special depreciation for specific equipment" has to be attached. (Forms to be used for each case same as the above)

Individuals have to describe in their final return, the addition of the depreciation amount into expenses, and those documents also have to be accompanied by "a detailed description regarding the calculation of the amount of depreciation for specific equipment."

Proof issued through the "system to prove specifications for energy-saving equipment" as described in Chapter 3 should be presented with the above records related to the tax report. (This proof is not based on law, therefore, there is no requirement to submit it. However, since the tax office refers to it, it should be submitted.)

Chart 5 Energy-Saving · Oil-Substitute-Using Equipment

(Notification No 34 of the Ministry of Finance - addition, 1978, No 27 in 1979, revised in No 30 in 1980)

No	Depreciable Property such as Machinery and Others	Time Period
1.	Heat Exchanger (limited to items that apply to one of the following)	
	1. Equipment whereby waste heat from combustion (including heat discharged from the object being heated) heats up air or fuel for combustion use. (Includes fans, used exclusively for this purpose, installed with the system)	from 1 April 1978 to 31 March 1982
	2. Equipment that utilizes cold heat that results from the vaporization of liquid natural gas. (Excludes equipment used for gas business)	same as above
	3. Total Heat Exchanger (Equipment where heat exchange with supplied air is made possible by measureable heat and latent heat from the exhaust air and which can handle over 1,000 cubic meters per hour)	same as above
	4. Heat Pipe Method Measureable Heat Exchanger (Equipment whereby heat exchange with supplied air is done by the measureable heat from the exhaust and which can handle over 2,000 cubic meters per hour)	from 1 April 1980 to 31 March 1982
2.	Boilers That Use Waste Heat (limited to items that apply to one of the following)	
	1. Equipment whereby steam is produced by waste heat from combustion (including heat descharged from the object being heated) (Includes special pump or pipes installed with the system)	from 1 April 1978 to 31 March 1982
	2. Equipment which automatically controls the amount of air and fuel in line with pressure changes in boiler, and which possesses a heat exchanger that heats up air and water provided into the boiler using waste heat of combustion created in the boiler. Only when the boiler creates less than 30 tons of rated steam per hour. (Includes pump or pipes, used exclusively for this purpose, installed with the system)	from 1 April 1980 to 31 March 1982

3. Waste-Pressure Recovery System-Equipment whereby waste-pressure gas (includes liquid form) that results from the manufacturing process is recovered and used. Applicable only where turbines and pipes are installed at the same time. Includes automatic control system that is installed with the system.	from 1 April 1978 to 31 March 1982
4. Dehumidifier Fan System for Industrial Furnace (limited to items that apply to one of the following) 1. Where lithium chloride and other moisture absorbents are used to dehumidify. Dehumidifier, regenerator, pump and pipes specifically used for this purpose are included. 2. System whereby moisture is absorbed by cooling the air supply. Includes freezer, air cooler, heat exchanger, cool water tank, pump and pipes specifically used for this purpose. 3. System which combines the above 2 including additional equipment mentioned above.	from 1 April 1978 to 31 March 1982
5. Energy-Saving Industrial Furnace (limited to items that apply to one of the following) 1. Among furnaces with an internal temperature of above 500°, those where the preheating unit which is used to preheat raw material using waste combustion heat, is connected to the unit that heats the furnace and where waste gas temperature and furnace temperature have a difference of over 150° by way of heat exchange. 2. For furnaces of over 500° temperature that are newly built, those where more than 50% of the inside area, excluding the bottom, is made of insulation material with a bulk unit weight of less than 1.3. 3. Those with a mechanism that automatically controls the ratio of combustible air and fuel flow in accordance with changes in furnace temperature and amount of combustion. 4. Those using an injection combustion method, with an injection speed of over 50m/second.	from 1 April 1978
6. Cupola Furnace With Divided Fanning System (limited to models where combustible air is blown in from more than 2 air vents, including the air control system installed with the system.	from 1 April 1980 to 31 March 1982
7. Steam Drain Recovery System (that is used to collect and reuse steam drain after the first use. Limited to only when steam trap, drain pump and pipes are installed at the same time. Includes special drain filter and drain tank installed with the system).	from 1 April 1978 to 31 March 1982

8.	Steam Accumulator (that is used to stabilize the load change in the boiler that results from a change in the amount of steam used. Limited to models where steam retention or vaporization, according to the amount of steam used, is done automatically.	from 1 April 1978 to 31 March 1982
9.	Improved Due-Purpose Absorbing Type Water Heater/Cooler (Limited to systems whereby while lithium bromide liquid or other absorbent liquid is being regenerated more than twice in its circulation process, the waste heat coming from the liquid's regeneration or condensation process either produces warm water or preheats combustible air or the absorbent liquid. Includes special plumbing installed with the system.)	from 1 April 1980 to 31 March 1982
10.	Cold Box Casting Mold Forming Machine - It hardens the casting sand by way of the chemical hardening reaction of organic bond material (except for a combustion reaction) using amine gasses as catalyst, and has a casting frame area larger than 0.09 square meter. (It is limited to those molding machines which have a core weighing more than 1 Kg.)	from 1 April 1978 to 31 March 1982
11.	Heat Source System That Uses a Heat Pump - Air conditioners or chilling unit (limited to those with reciprocating or rotary compressor) that uses a heat pump, with a total rated electric power consumption of over 30 kilowatts. Includes special plumbing for heat collection, pipes and heat storage tank that are installed with the system.	from 1 April 1978 to 31 March 1982
12.	Insulated Wall of a Storage Tank - Insulation that is attached to the outer wall of the steel storage tank, which has a system by which the stored item is heated. Limited to the ones consisting of insulating material of over 10mm thickness with a thermal conductivity of less than 0.1 kilocalorie per hour, per meter and per degree.	from 1 April 1978 to 31 March 1982
13.	Generator That Utilizes Waste Heat at Low to Medium Temperatures - System that generates electricity using waste heat from the manufacturing process. Limited to those where the temperature at the entrance to the evaporator is over 500°, excluding ones used for electrical operations. Applicable only when evaporator, turbine, generator, compressor, pump, plumbing and automatic control system are installed at the same time. Includes preheater (limited to those that preheat heating medium by using the above-mentioned waste heat) or a heat storage tank installed with the system.	from 1 April 1980 to 31 March 1982
14.	High Efficiency Radiator Heater (limited to items that apply to one of the following)	from 1 April 1980 to 31 March 1982

14. 1. System where the heat, created by combustion, is radiated through a tube directly connected to the system where combustion takes place. Limited to systems where over 10,000 kilo calorie combustion can take place per hour and applicable only when the combustion system, tube, reflecting board are installed at the same time. Includes automatic control system, fan or vacuum pump installed with the system.

2. System where the floor, heated with electricity or warm water, radiates heat. Applicable only when heat generator, heat storage board (whose total area is over 100 square meter), and adiabatic board are installed at the same time. Includes an automatic control system, pump and plumbing installed with the system.

15. Electric Power Load Control System (limited to items that apply to one of the following)

from 1 April 1980
to 31 March 1982

1. The system that controls electric power load by automatically opening and closing a circuit connected to a system that only uses a designated amount of electricity according to a planned procedure. Applicable only when the electric power monitoring device and automatic control system are installed at the same time. Includes special detector or relay installed with the system.

2. Rotation (frequency) control system that regulates electric power load by automatically changing the rotation frequency of the motor's output spindle in accordance with the power needed by the motor driven equipment, or a speed changing system that does the same by changing the spindle's rotation frequency with the use of a hydraulic coupling. Includes special automatic control system, detector, switch or a transformer installed with the system.

3. System that regulates electric power load with automatically controlled lighting, regulated by a control command signal transmitted in accordance with a pre-arranged program. Limited to when special light control system and device which switches the light on and off or adjusts it are installed at the same time. Includes wiring for signal transmission installed with the system.

16. Diesel Engine for Ship - Applies when the diesel engine replaces a steam burbine used as the main locomation of a ship. (Either container ships of over 40,000 total tonnage or oil tankers with a total tonnage of over 100,000, that have been launched after 1 June 1971 are covered.) Only diesel engines which will be the main locomotion and fuel consumption rate of which is less than 155 g per hour are applicable. Speed reducing device installed with the system is included.

from 1 April 1980

17.	Heating and Cooling System Using Solar Energy - System equipped with a solar energy collector or more than 50 square meters surface. Applicable only when solar energy collector, heat storage tank, auxiliary heat source, automatic control, plumbing and pump or fan are installed at the same time. Includes freezer or cooler driven by warm water heat absorbing system or Rankin cycle engine.	from 1 April 1978 to 31 March 1982
18.	Coal Burning System - System which can burn more that 1.5 tons of fine powder coal per hour. Ones used for electrical operations are excluded. Applicable only when burner, automatic coal supply system, coal pulverizer and fan are installed at the same time. Includes coal dryer used exclusively for this purpose installed with the system.	from 1 April 1980 to 31 March 1982
19.	Hydro Power Electric Generator - Used for Hydroelectric generation of more than 1,000 kw of maximum output. Applicable only when a water wheel, speed governor, water control valve are installed at the same time.	from 1 April 1980 to 31 March 1982
20.	Electric Generator Using Terrestial Heat - Those used to generate more than 1,000 kw of maximum electrical output. Applicable only when condenser and cooling tower are installed at the same time and include its own pump or plumbing, (from turbine to condenser, from condenser to cooling tower, or from condenser or cooling tower to connecting pumps.)	from 1 April 1980
21.	Chip Burning System (limited to items that apply to one of the following) 1. Chip burning boiler-boiler that uses chips as fuel and produces more than 1 ton of steam per hour. Includes pump or fan installed with the system. 2. Chip burning hot air generator-heat generator that uses chips as fuel. Includes special fan installed with the system. Limited to those that produce more than 2,000 m^3 of hot air per hour with a temperature of over 150° when leaving the hot air mixing room.	from 1 April 1980 to 31 March 1982
22.	Hot Air Generator Using Agricultural By-Products - Mainly those that generate hot air by burning chaff. Limited to those that can burn more than 500,000 kilocalorie per hour. Applicable only when chaff burning system, chaff provider and fan connected to them are installed at the same time. Includes heat exchanger and fan or cinders cooling system connected to it.	from 1 April 1980 to 31 March 1982

Note - 1 "When -------- are installed at the same time" in the Notification of the Ministry of Finance basically means that more than two pieces of equipment are installed consecutively before they are used for business and does not mean that they are installed physically "simultaneously." Therefore it is applicable when more than 2 pieces of equipment are installed at a reasonable interval in the same business year, within the designated time period.

Note - 2 "Limited to XXXXX and includes YYYYY installed with the system" means that designated equipment is limited to XXXXX but when YYYYY are installed at the same time, YYYYY also become the objects of depreciation. YYYYY will not be covered when only XXXXX are installed or YYYYY are installed after a considerable amount of time after the installment of XXXXX.

Form 16-1 (When fixed amount method is used)

Form 16-1 Size of paper; Japanese Industrial Standard B5

Detailed statement regarding calculation of amount of depreciation using fixed amount method.

1. Business Year

2. Name of Corporation

A. Property
   1. Type
   2. Structure
   3. Details
   4. Date put into service

B. Acquisition Price
   5. Purchase or manufacturing cost (yen)
   6. Mortgage amount using reduced value entry
   7. Adjusted acquisition cost (5) minus (6)
   8. Remaining amount

C. Price in Ledger
   9. Price in ledger as of the end of the term
   10. Mortgage amount as of the end of the year
   11. Mortgage amount paid back during the term
   12. Adjusted price in ledger (9) minus (10) minus (11)
   13. Basic amounts used to calculate amount of depreciation using the fixed amount method
   14. Number of years of durability (number of years)
   15. Depreciation rate

D. Maximum amount of depreciation for this term

   a. Maximum amount of regular depreciation incurred this term

   16. Calculated amount of depreciation (13) x (15) (yen)
   17. Increased amount of depreciation (16) x addition rate
   18. Total

   b. Maximum amount of special depreciation

   c. Additional depreciation

   19. Applicable provisions from the Special Taxation Measures Law (number of provision)
   20. Accelerated depreciation (yen)

   d. Special depreciation

21. Applicable provisions from the Special Taxation Measures Law (number of provision)
22. Special depreciation (yen)
23. Total (20) + (22) ("other")
24. Deficit for depreciation carried over from the preceding term
25. Total (18) + (23) + (24)
26. Amount of depreciation for this term

E. Differences

27. Deficit for depreciation (25) minus (26)
28. Excess amount of depreciation (26) minus (25)

F. Excess amount of depreciation

29. Amount carried over from the preceding term

a. Acknowledged amount of loss for this term

30. Amount due to too little depreciation
31. Amount due to mortgage pay back
32. Adjusted total amount carried over to the following term (28) + (29) minus (30) minus (31)

G. Depreciation Deficit

33. Deficit amount to be carried over to the following term - the smaller of (27) minus (30) or (23) + (24)
34. Amount of deficit of depreciation cut off during this term
35. Adjusted amount to be carried over to the following term (33) minus (34)

a. Breakdown of the amount carried over to the following term

36. Date
37. Date
38. Date
39. Date
40. Date
41. Deficit for this term

H. Remarks

Directions for Form 16-1

1. This form should be filled out when the corporation uses the fixed amount method to determine the maximum amount of depreciation for its depreciable property. When the provisions of the Special Taxation Measured Law concerning special depreciation apply, (excluding Article 49, Paragraph 1 - special depreciation for coal mining tunnel - and Article 50, Paragraph 2 - special depreciation of afforestation cost. The same for Paragraphs 6 and 7 of "Directions for Form 16-1) the pertinent explanation regarding calculation of the maximum amount special depreciation should be written on a separate sheet of paper and attached to this form.

2. (1) Type, (2) Structure and (3) Details should be filled in according to those stipulated in the Ministry Ordinance Chart 1 to 9 concerning the number of years of durability of depreciable property.

3. (4) Date put into service: Put down the date, during the business year, that the equipment was put into service. However, when Article 59, Paragraph 2 (simplified calculation for machinery and equipment) applies, put down "Acquired during term."

4. (8) Remaining amount: Put down an amount equivalent to 5/100 of (7) Adjusted acquisition cost of (the tangible fixed) property only for tangible depreciable property.

5. (17) Increased amount of depreciation: Put down increased depreciation rate stipulated in Article 60 - rate of increased depreciation.

6. In the accelerated depreciation (20), put the special depreciation limit amount according to the stipulation (it includes the stipulations of Special Taxation Measures Law - Article 49, Paragraph 2 - wind tunnel, etc. accelerated depreciation. In the next section it is called the "accelerated depreciation stipulation.") regarding accelerated depreciation, among the stipulations for special depreciation according to the Special Taxation Measures Law. Put within the parentheses of the same line that special depreciation rate.

7. (22) Special depreciation: Put in the amount of special depreciation stipulated by other provisions than the stipulation concerning accelerated depreciation that are included in the Special Tax Measures Law, and put down the rate of depreciation in the parentheses.

8. Column (23): Put down the amount in where it says "other" when Article 52, Paragraph 3 - special depreciation through reserve method - of the Special Taxation Measures Law applies.

9. For things that are covered in Article 63, Paragraph 2 - detailed statement concerning depreciation: If the total amount as stipulated in that provision is indicated, entries from (2) to (4), (8) to (11), (14), (15) and from (36) to (41) are not necessary.

Form 16-2 (When fixed rate method is used)

Form 16-1 Size of paper; Japanese Industrial Standard B5

Detailed statement regarding calculation of amount of depreciation using fixed rate method.

1. Business Year

2. Name of Corporation

A. Property
   1. Type
   2. Structure
   3. Details
   4. Date put into service

B. Acquisition Price
   5. Purchase or manufacturing cost (yen)
   6. Mortgage amount using reduced value entry
   7. Adjusted acquisition cost (5) minus (60
   8. Remaining amount

C. Basic amounts used to calculate amount of depreciation using fixed rate method
   9. Price in ledger as of the end of the term
   10. Mortgage amount as of the end of the year
   11. Mortgage amount paid back during the term
   12. Adjusted price in ledger (9) minus (10) minus (11)
   13. Amount of depreciation for this term that was added to losses
   14. Exessive amount of depreciation carried over from the preceding term
   15. Deficit of depreciation carried over from the preceding term
   16. Difference (12) + (13) + (14) minus (15)
   17. Number of years of durability (number of years)
   18. Depreciation rate

D. Maximum amount of depreciation for this term

   a. Maximum amount of regular depreciation incurred this term

   19. Calculated amount of depreciation (16) x (18) (yen)
   20. Increased amount of depreciation (19) x addition rate
   21. Total

   b. Maximum amount of special depreciation

   c. Additional depreciation

   22. Applicable provisions from the Special Taxation Measures Law (number of provision)
   23. Accelerated depreciation (yen)

d. Special depreciation

24. Applicable provisions from the Special Taxation Measures Law (number of provision)
25. Special depreciation (yen)
26. Total (23) = (25) ("other")
27. Deficit for depreciation carried over from the preceding term
28. Total (21) + (26) + (27)
29. Amount of depreciation for this term

E. Differences

30. Deficit for depreciation (28) minus (29)
31. Excess amount of depreciation (29) minus (28)

F. Excess amount of depreciation

32. Amount carried over from the preceding term

a. Acknowledged amount of loss for this term

33. Amount due to too little depreciation
34. Amount due to mortgage pay back
35. Adjusted total amount carried over to the following term (31) + (32) minus (33) minus (34)

G. Depreciation Deficit

36. Deficit amount to be carried over to the following term - the smaller of (30) minus (33) or (26) + (27)
37. Amount of deficit of depreciation cut off during this term
38. Adjusted amount to be carried over to the following term (36) minus (37)

a. Breakdown of the amount carried over to the following term

39. Date
40. Date
41. Date
42. Date
43. Date
44. Deficit for this term

H. Remarks

Direction for Form 16-2

1. This form should be filled out when the corporation uses the fixed rate method to determine the maximum amount of depreciation for its depreciable property. When the provisions of the Special Taxation Measures Law concerning special depreciation apply, (excluding Article 49, Paragraph 1 - special depreciation for coal mining tunnel - and Article 50, Paragraph 2 - special depreciation of afforestation cost. The same for Paragraphs 6 and 7 of "Directions for Form 16-2) the pertinent explanation regarding calculation of the maximum amount for special depreciation should be written on a separate sheet of paper and attached to this form.

2. (1) Type, (2) Structure and (3) Details should be filled in according to those stipulated in the Ministry Ordinance Chart 1 to 9 concerning the number of years of durability of depreciable property.

3. (4) Date put into service: Put down the date, during the business year, that the equipment was put into service. However, when Article 59, Paragraph 2 (simplified calculation for machinery and equipment) applies, put down "Acquired during term."

4. (8) Remaining amount: Put down an amount equivalent to 5/100 of (7) Adjusted acquisition cost of (the tangible fixed) property only for tangible depreciable property.

5. (20) Increased amount of depreciation: Put down increased depreciation rate stipulated in Article 60 - rate of increased depreciation.

6. In the accelerated depreciation (23), put the special depreciation limin amount according to the stipulation (it includes the stipulations of Special Taxation Measures Law - Article 49, Paragraph 2 - wind tunned, etc. accelerated depreciation. In the next section it is called the "accelerated depreciation stipulation") regarding accelerated depreciation, among the stipulations for special depreciation according to the Special Taxation Measures Law. Put within the parentheses of the same line that special depreciation rate.

7. (25) Special depreciation: Put in the amount of special depreciation stipulated by other provisions than the stipulation concerning accelerated depreciation that are included in the Special Tax Measures Law, and put down the rate of depreciation in the parentheses.

8. Column (26): Put down the amount in where it says "other" when Article 52, Paragraph 3 - special depreciation through reserve method - of the Special Taxation Meausres Law applies.

9. For things that are covered in Article 63, Paragraph 2 - detailed statement concerning depreciation: If the total amount as stipulated in that provision is indicated, entries from (2) to (4), (8) to (11), (13) to (15), (18) and (39) to (44) are not necessary.

Form 16-6 (When the reserve method is used)

Form 16-6: Detailed statement regarding the addition of the money set aside in installments for special depreciation (reserve method) into losses. The size of form: JIS (Japanese Industrial Standard) B5

1. Business Year

2. Name of Corporation

1. Type of special depreciation
2. Installment for this term (yen)

a. Maximum amount of installment for this term

3. Maximum amount of depreciation for this term
4. Deficit of installment carried over from the preceding term
5. Maximum amount set aside in installments (3) + (4)

b. Difference

6. Excess over the maximum amount set aside in installments
7. In the case of accelerated depreciation
8. In the case of the 1st year depreciation

c. & d. Deficit in amount set aside in installments

9. Deficit to be carried over to the following term
10. Deficit to be cut off during this term
11. Revised amount carried to the following term (9) minus (10)

e. Breakdown of the amount carried over to the following term

12. Date
13. Date
14. Date
15. Date
16. Date
17. Amount for this term (7) or (8)
18. Total sums of 12 through 17

f. Calculation of amount added to profit

g. Business year installment took place

h. (19) The amount added to losses from the beginning installment

i. (20) Amount of money set aside at the beginning of the present term

j. Amount added to profit this term

k. (23) Amount carried over to the following term (20) minus (21) minus (22)

l. (21) When dissolved in equal amounts (19) x $\frac{\qquad}{84 \text{ or } 120}$)

m. (22) Cases not covered by (21)

n. Date

o. For this term

p. Total

(19) - (23) unit yen

Directions for Form 16-6

1. This form should be filled out when Article 52, Paragraph 4 - special depreciation using reserve method - of Special Taxation Measures Law applies to corporations. This detailed statement should be written out on separate sheets for each different type of special depreciation.

2. (3) Maximum amount of installment for this term: Put down the total of amounts that appear in "other" in the colums of "maximum amounts of special depreciation" of forms 16-1 to 16-4.

3. 1-(21) "19 x $\frac{\qquad}{84 \text{ or } 120}$": Put the amount of money set aside for special depreciation during the business year and calculate. When it ends after 1 April 1976, use 84 and before 1 April 1976, use 120.

Additional Form - relating to the calculation of amount of depreciation for specific equipment - (Special Taxation Measures Law 43, 44 Ordinance 28, 28-2)

Business Year Name of Corporation

1. Specific property categories (applicable ordinance number)

2. Type of business

3. Type of specific equipment (put number from the chart indicating the years of durability for machine or equipment)

4. Name of specific equipment

5. Name of factory or office installed

6. Date put into service

7. Bought from

8. Purchase price (yen)

9. Rate of special depreciation

10. Maximum amount for special depreciation (yen)

a. Computation for exceptions for small and medium businesses

11. Amount of depreciation (8) x $\frac{90}{100}$ x $\frac{\text{number of months served for business}}{\text{36 or 60}}$

12. Amount for regular depreciation

13. Amount for special depreciation

14. Depreciation or reserve method

b. Depreciation
Reserve deposit

15. Other pertinent information: Information important in making judgement, such as specifications and capabilities of specific equipment used for business.

Directions for Additional Form

1. Please fill in the pertinent information concerning the computation of the special depreciation amount and submit with Form 16 when Special Taxation Measures Law - Article 43 (special depreciation for specific equipment) or Article 44 (exception to the special depreciation for pollution protection equipment for small and medium businesses) apply, or when, instead of the above, the stipulation of Article 52-3 (reserve method for handling special depreciation) applies.

2. (1) Specific property categories: Put down the number of the category it falls into from the chart in Special Taxation Measures Law, Article 43, Paragraph 1.

3. (2) Type of business: Put down the type of business which the equipment is used for.

4. (3) Type of specific equipment: Put down "types," "categories," "machinery and other equipment," "specific railway construction" and "building construction" from the chart in notification regarding specific equipment. (Notification No 69, 1973 and others of the Ministry of Finance) When the specific equipment is a piece of machinery, choose the number that corresponds with the number of years of durability from the chart of Ministerial Ordinance and put it down in parentheses.

5. (4) Name of specific equipment: Put down the name that corresponds to the specific equipment's listing.

6. (9) Rate of special depreciation: Pur down rate that corresponds to that on the chart from Article 43, Paragraph 1 of the Special Taxation Measures Law.

7. (11) Amount of depreciation: Erase 36 (use 60) when the equipment was acquired after 1 April 1978. Erase 60 (use 36) when acquired before then.

8. (14) Depreciation or reserve method: Circle the method used to handle the maximum amount of special depreciation.

9. (15) Other pertinent information: Put down, as concretely as possible, information that would help in proving that the specifications and functions of the acquired equipment do correspond with those described in the notification from the Ministry and therefore can be regarded "specific equipment."

9782
CSO: 8129/1251

SCIENCE AND TECHNOLOGY

PROGRESS OF NATIONAL PETROLEUM STOCKPILE PROJECTS REVIEWED

Tokyo TSUSAN JANARU in Japanese Jul 81 pp 102-110

/Article by Tokuzo Ikeda, chief, Stockpile Planning Division, Japan Petroleum Development Corporation/

/Text/ How Far Have Stockpiling Efforts Progressed in Japan Where Increased Oil Stockpiling Is of Great Urgency

Basis of Safety Assurance--Positioning World Trends and Oil Stockpiling

Trends of Oil Producing Countries Which Increase Instability

The energy revolution which has been taking place since World War II has caused great changes in the energy consumption structure and during the past 30 years this has resulted in the primary energy source of the world's major companies been replaced for the most part by oil.

On the other hand, the fourth Middle East War (October 1973) was the wedge which precipitated the first oil crisis and resulted in the oil producing companies, particularly OPEC, undertaking to reinforce its market controlling power and bringing about a number of changes in the oil price and handling routes (increase in D-D crude oil, G-G crude oil).

In addition, during the past year the situation in the Middle East, which is the largest oil producing area, has been unpredictable in nature due to increased instability in these oil producing countries as evidenced by the Iranian revolution of 1978, followed by the Iranian-Iraqi confrontation, and the net result has been that most recently the world's energy picture has intensified in its stability.

In another direction, when future oil supplies are reviewed, just as is the case with all other forms of fossil energy, it will be realized that oil resources are finite so that an oil production limitation will be attained along about 1990, after which oil production is expected to decrease gradually and a greater stringency in the oil supply and demand picture cannot be avoided (according to the IEA /International Energy Agency/ estimates of oil supply and demand of the free world, assuming the production capacity of OPEC will have hit its peak, there will be a supply insufficiency of 4.2 million B/D in 1985 /compared to demand of 58 million B/D/ and insufficiency of 6.6 million B/D in 1990 /compared to demand of 61.7 million B/D/).

Brittle Oil Supply Base of Japan and Energy Safety Assurance

In the midst of the world's situation, Japan depends on oil to provide more than 3/4 of its primary energy, and furthermore 99.8 percent of this oil is obtained by import (imports from the Middle East countries accounts for about 80 percent). The fraction of total imports accountable to oil is 72.1 percent which is far more than the oil and coal producing countries such as the United States and the United Kingdom use, and a comparison with certain European countries whose situation is similar to Japan's such as Germany show Japan's oil import dependence is far greater. In other words, there is no other country in this world which has to depend so much on imported oil. When combined with the aforementioned political instability of the Middle East, it can be said that Japan's energy supply situation is in a very sensitive and unstable state. This is all the more reason why Japan's energy safety assurance system needs to be established quickly, and this is the most urgent subject facing the Japanese.

Now, needless to say, in order to establish energy safety assurance, we must plan to disengage ourselves from this great dependency on oil through measures such as promotion to oil exploration, substitute energy development, and promotion of energy conservation measures. On the other hand, the promising oil substitute energy forms such as nuclear fusion, solar energy, or hydrogen are all still in early research stages, and it is estimated that it will be at least in the 21st Century before technological developments will have progressed to the state that effective use can be made of these sources. Where energy conservation is concerned, the readily practiced processes have already been tested, and what is left is development of new energy conservation technology and large capital expenditure for energy conservation. But conservation of energy, just as substitute energy, is not a basic solution to the oil insufficiency problem, and there is a self-generated limit. This is why when one considers the substitute energy development picture, there is no other course but to depend on oil to supply our needs in the near future.

As discussed above, when the various restrictions are taken into account, the subject of establishing energy safety assurance can be considered in the following manner. In other words, where the urgency of the mid- and long-term oil demand and supply situation is concerned, it is important that development of oil substitute energy and energy conservation measures be promoted as much as possible. At the same time, dependence on the politically unstable Middle East should be reduced, and all efforts directed at diversifying oil sources. Concerning the aforementioned battle situation involving the Middle East oil producing countries, the most effective countermeasure against such sudden changes is to increase as much as possible the volume of stockpiled oil. Oil stockpiling is expected to assume even greater importance as the political situation of the Middle East deteriorates.

Measures Taken by the European Countries

This need for stockpiling of oil has been recognized in the different European countries at a fairly early stage, and formerly there was an international effort in this direction spearheaded by the OECD, but at a meeting of the directors of OECD on November 1974 the International Energy Plan (IEP) was drawn up, and the promotion of this plan was assigned to a self-governing organ within the OECD framework called IEA. IEA set up a goal of a 90-days supply stockpile for each of the participating countries by 1990 and also has engaged in various emergency oil financing systems and the establishment of international oil stockpiling activities.

Incidentally, the stockpiled level of these principal countries as of 1 July 1980 averaged the high level of 140 days supply among the IEA. At the same time, the United States has embarked on a course to ease the impact of decreased oil supply and to uphold its part in the IEA by putting into its petroleum strategic reserves 750 million bbl (120 million kiloliters) by 1989.

Japan's Petroleum Stockpile

The stockpiling system of Japan at the present time is comprised of the two main pillars of private stockpiling under the oil stockpiling law and the national stockpile being amassed by the Petroleum Public Corporation. The oil stockpiling is being carried out primarily from the standpoint of safety assurance of the country's economy, and when the national significance, vast capital, and cost burden are considered, it is basically an obligation of the country to take on this responsibility. On the other hand, in view of the need for smooth handling in times of emergency and the use of various experiences accumulated by the private oil industry in handling oil, it was decided to let the oil industry which normally handles the country's oil supply conduct this service as a function of the powerful subsidy management of the country. As a result, stockpiling duties were assigned to the refining industry based on the oil stockpiling laws which went into effect in 1975, and a reinforcement of planned stockpiling was promoted which succeeded in attaining a 90-day reserve level by JFY 1980. On the other hand, when the sensitive nature of Japan's oil supply structure, the recent governmental instabilities in the Middle East countries, and the high level of oil reserve stockpile attained by the Western countries are reviewed, it becomes clear that a 90-day stockpile for private use is not sufficient. When seen from this viewpoint, it was decided that Japan should have a stockpile at least on a par with the Western countries, and the portion over that of the 90-day supply of private oil was assigned to the Petroleum Public Corporation, and a national stockpile was started in JFY 1980. The present status and future plans of this national oil stockpile are discussed below.

At the present time, the Petroleum Public Corporation is targeting a national oil stockpile of 30 million kiloliters by the end of JFY 1988. If 30 million kiloliters are actually to be put in storage, it will require the addition of 2.5-3.0 million kiloliters per year from now on and this amounts to about a 44 million kiloliter equivalent where stockpiling base facilities are concerned (this will require 10 sites each with capacity of 4.0-5.0 million kiloliters) on a facility capacity base (stockpiling rate of about 70 percent).

Now, the path of this national stockpiling structure is not always smooth. All-out cooperation on the part of the neighborhood people is a must for promotion such a large-scale project, and it is extremely difficult to realize these conditions under the present situation. The Oil Public Corporation has thus far conducted three rounds of FS (feasibility studies) to seek out possible sites for only one stockpiling location. The prospective candidates were required to fulfill the following specific conditions. 1) The site is feasible from the standpoints of technology and economy, 2) there is a promotion system centered on key industries which will actually handle the construction operations of the base, and 3) initiation of operations starting from those sites at which local surveys have started. At the present time, Ogawabara in Mutsu, eastern Tomokomaki, the Shirojima projects are making the shift to actual operation. Although no optimistic evaluation on future directions can be projected, possible projects are being reviewed one after the other. The following are some of the projects which are being studied as possible candidates.

1) Akita Project (third set FS candidate)
   Site: Funakawa District, Oga-shi, Akita-ken
   Site area: about 100 hectares
   Capacity of stockpiling facility: about 5-7.5 million kiloliters

This project should be noted as Japan's first oil storage using underground tanks.

2) Niigata Project (third set FS candidate)
   Site: Coastal industrial belt at Higashi Minato, Niigata Prefecture
   Site area: about 140 hectares
   Capacity of stockpiling facility: about 3.36 million kiloliters

There is a base of the Niigata Joint Oil Stockpile (Co) at the coastal industrial belt of Higashi Minato in Niigata Prefecture for which the Petroleum Public Corporation has advanced capital.

3) Fukui Project (was deemed feasible in the first set FS)
   Site: Fukui-shi and Sangoku-machi in Fukui-ken
   Site area: about 150 hectares
   Stockpiling capacity: about 3.3 million kiloliters

This is the site at which reclamation work was initiated to construct a base for Fukui-ken in June 1981.

4) Kami Goshima Project (was deemed feasible in the first set FS)
   Site: Aogata Port, Nakadori Island, Goshima Islands, Nagasaki-ken
   Area: Land area: about 10 hectares
         Sea area: about 40 hectares
   Capacity of stockpiling facility: about 6 million kiloliters (7 floating tanks each of 800,000 kiloliters capacity)

This is where agreement was reached with the related fishing cooperatives on fishing rights in June 1981.

5) Shibushi Project (third set FS candidate)
   Site: Shibushi Port, Kagoshima-ken
   Site area: 120-240 hectares
   Capacity of stockpiling facility: 5-10 million kiloliters

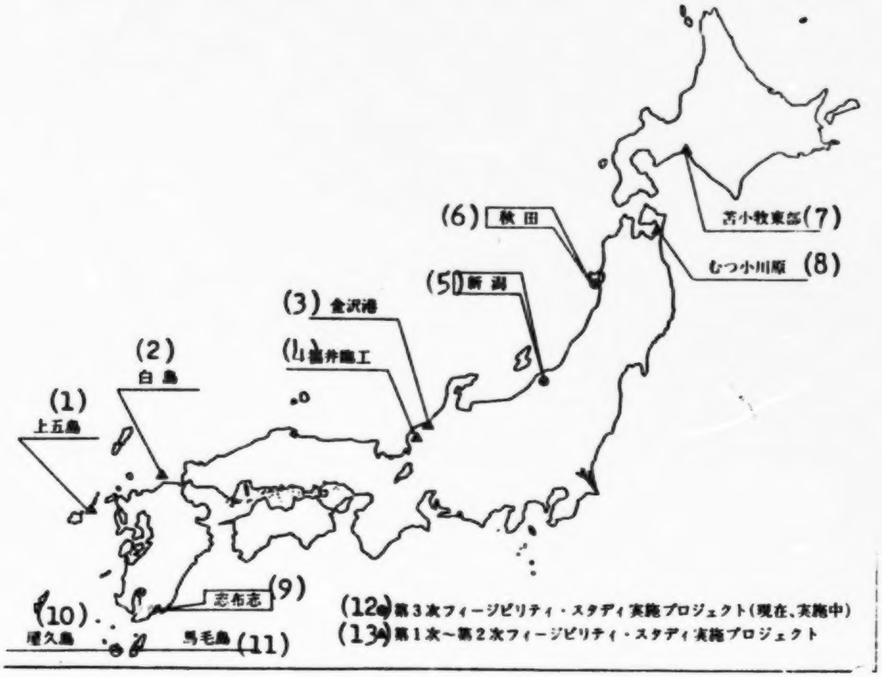
Since the Shibushi shoreline is part of a national part, studies are underway to blend the stockpiling base in with the natural background.

In addition, research is underway on an entirely different underground storage different from the tank mode used in the past, and demonstration experiments will be underway for which Kikuma in Ehime-ken, Kushikino in Kagoshima-ken, and Kuji in Iwate-ken are candidates.

Large-Scale Land Based Stockpiling Bases

The Mutsu Ogawabara Project is one which has been promoted as a large-scale industrial base under the New All Japan Comprehensive Development Plan which was drawn up in 1969. The area coming under the land utilization plan for this industrial base is about 5,000 hectares, and nearly all of this land has already been purchased. It is in the position that once construction is completed it can be used immediately as an industrial base. This industry has not developed, as expected, along with the stable growth in Japan's economy. This area had long sought to be effectively utilized, and here was a good match between the local situation and the urgency for a national stockpiling base construction so it was selected as the first site for construction of a national stockpiling base. About 260 hectares of this land area will be utilized to construct a permanent base for about a 5.7 million kiloliter storage, but the main plan of this industrial scale, unprecedented in the northeast region, is significant not only because it is the first national stockpiling base but it is the spearhead of industrial development in this area.

Figure 1. Map of Possible Sites Under Survey


(6) 秋田
苫小牧東部(7)
むつ小川原 (8)
(5) 新潟
(3) 金沢港
(4) 福井臨工
(2) 白島
(1) 上五島
志布志(9)
(10) 屋久島
馬毛島(11)
(12●) 第3次フィージビリティ・スタディ実施プロジェクト(現在、実施中)
(13▲) 第1次～第2次フィージビリティ・スタディ実施プロジェクト

Key:
1. Kami Goshima
2. Shirojima
3. Kanazawa Port
4. Fukui coastal area
5. Niigata
6. Shibushi
7. eastern Tomakomaki
8. Mutsu Ogawabara
9. Shibushi
10. Yakujima
11. Magejima
12. ● Execution project from 3rd set feasibility study (presently under construction)
13. ▲ Execution project from 1st and 2nd set feasibility studies

The following is an outline of this project.

Stockpiling mode: above ground steel tanks
Capacity of stockpiling facility: about 5.7 million kiloliters (51 tanks each of 110,000-200,000 kiloliters)
Area: about 260 hectares
Construction cost: about 136 billion yen
Expected completion: one section completed by end of JFY 1982
totally completed by end of JFY 1983

The Mutsu Ogawabara Oil Stockpiling (Co) was set up with Toa Oil (Co) as principal party to construct and operate this stockpiling facility, and this new firm is getting ready to start its operations.

The eastern Tomakomaki Project is a large-scale oil stockpiling base adjacent to the Hokkaido Joint Stockpile Project under joint operation of the Petroleum Public Corporation and private industry, and once these two projects are completed, it is expected they will provide the world's largest oil storage base which will even exceed the Rotterdam facility.

The following is a general outline of this project.

Stockpiling mode: above ground steel tanks
Capacity of stockpiling facility: about 6.2 million kiloliters (55 x 110,000 kiloliter units)
Area: about 286 hectares
Construction cost: about 150 billion yen
Expected completion: southern sector completed by end of JFY 1983
northern sector completed by end of JFY 1985

The Tomakomaki Eastern Oil Stockpile (Co) was formed with Shukko Kyosan (Co) as principal party to construct and operate this stockpiling facility and is about to start operations.

World's First On-Sea Stockpiling Base--Shirojima

The Shirojima On-Sea Oil Stockpiling Base is a floating type structure (floating tank mode) which will be the first on-sea oil stockpiling system.

The Oil Public Corporation has been engaged for some time in feasibility studies on this system enlisting the cooperation of the Safety Engineering Society, Japan Shipbuilding Technology Center, and the Japan Harbor and Bay Association to plan this base, and it was concluded at the January meeting of the National Oil Stockpiling Base Plan Study Committee that this plan is both economically and technologically feasible. At the same time, agreement was reached with the local governments of Fukuoka-ken, Kita Kyushu-shi, Yamaguchi-ken, and the local fishing cooperatives, and the Shirojima Oil Stockpile (Co) which will be the main promotional body was formed on 8 June.

The following is a general outline of this plan.

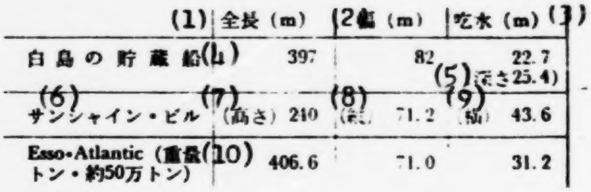
Planned site: Shirojima seacoast, Wakamatsu-ku, Kita Kyushu-shi
Stockpiling mode: floating tank mode
Capacity of storage facility: about 5.60 million kiloliters
Number and capacity of storage vessels: about 700,000 kiloliters x 8 vessels
Required area: land area: (land facility) about 14 hectares
sea area: (vessel mooring area) about 60 hectares

The appearance of this base on completion is shown in Fig 2.

The deployment plan provides for filling in of the eastern sea area of Shirojima (Otokojima) where the control facility, service facility, and waste water treatment facility will be located. An enclosed docking area completely shielded from the sea will be provided through this fill-in and breakwater pier where the storage vessels will be moored to dolphins and aligned together. Each vessel will be enclosed by a breakwater pier. There will be a sea bass /phonetic/ for oil loading and unloading at a site roughly 800 meters to the northeast of this fill-in area.

Each storage vessel will have a capacity of about 700,000 kiloliters, and comparison of its size with Japan's largest building Nopoville Sunshine and the largest tanker built to date in Japan, the Esso-Atlantic, is given in a separate table.

Table



	(1) 全長 (m)	(2) 幅 (m)	吃水 (m) (3)
白島の貯蔵船 (4)	397	82	22.7 (5) (深さ 25.4)
(6) サンシャイン・ビル	(7) (高さ) 240	(8) (奥行) 71.2	(9) (幅) 43.6
Esso-Atlantic (重量トン・約50万トン) (10)	406.6	71.0	31.2

Key:
1. overall length (m)
2. width (m)
3. draught (m)
4. storage vessel at Shirojima
5. (depth 25.4)
6. Sunshine Building
7. (height)
8. (length)
9. width
10. Esso-Atlantic (deadweight tonnage about 500,000 tons)

In this manner, a single storage vessel will have about the same length as the largest tanker ever built in Japan, but it will have a broader width making it better strengthwise. Because its shape is rectangular, it will have 1.4 times more capacity making it more economically advantageous. Where the outer wall of tankers of the past were constructed out of a single plate of steel, this storage tank will have double wall construction throughout its sides, bottom, and partition walls, leaving only the upper section in single wall construction. This vessel will be filled with seawater in a safety measure to be employed.

The mooring dolphins will serve to safely moor these storage vessel under adverse conditions such as bad weather. These mooring dolphins will be giant caissons, their length, width, and height respectively will be 22, 26, and 30 meters, and they will be made of concrete and each weigh about 9,000 tons. Construction and installation are presently proceeding on these mooring dolphins and the various breakwaters which comprise the mooring site along with the caissons of this four-pier project, and there is expected to be greater experience in the design and construction of the piers and abutments which go into these piers. More specifically, these caissons will be produced at a caisson yard in nearby North Kyushu-shi and will be towed by tug through roughly 8 kilometers of the open sea to its site where it is expected to be installed with a precision of ± 10 centimeters.

This plan is based on the premise of adequate comprehensive technology including shipbuilding engineering and marine engineering, and Japan possesses world ranking technology in each area, and this plan attracted great interest at the international meeting of ECOR (the Engineering Committee on Ocean Resources) which is an international society on marine affairs, at its last meeting (in London in April 1981).

Tanker Fleet, Tanker Storage of Stockpiled Oil

Needless to say that there will be a need for increasing stockpiling capabilities even while permanent national stockpiling bases are being constructed. One of the ideas advanced in this direction is tanker storage. This is a concept well suited to a seafaring country such as Japan, and this project was started in 1978. At the present, there are 26 VLCC, and one ULCC for a total of 27 vessels which store 7.5 million kiloliters.

What concerned the Petroleum Public Corporation where tanker storage was concerned was, understandably, the safety aspect, and some very stringent safety standards were established as conditions for use of such vessels. At the same time, an "oil storage tanker control mechanism" was set up in order to promote thorough safety control, and all efforts at safety are being promoted. There are 13 tankers moored in Nagasaki-ken harbor which has been an anchorage in the past and 7 vessels in the newly established anchorages at Usukine Bay, Tsukumi Bay, and Saiki Bay in Oita-ken with another 7 vessels in the Iojima peripheral area.

It is said that presently there are 88 Japanese box VLCC operating, and this means that roughly a third of this total is being used as national stockpiling tankers. Japan, fortunately, managed to survive last fall's Iranian-Iraqi conflict without undue strain on its economic status, and it was the "soundless weight" of this oil stockpiling which made it possible to avoid this confusion. When one looks from the deck of one of these vessels of the other tankers deployed throughout the bay, there is a feeling that one is seeing the safety assurance of a new Japanese generation being manifested in line with the flow of the times.

Construction of permanent stockpiling bases has also gotten into the groove so that tanker stockpiling is expected to peak out at about 10 million kiloliters and then gradually decrease. It may be said that the mobility of these tankers is being fully exploited in these stockpiling activities and they are playing very important roles.

The Coming Underground Stockpiling Mode

The idea of storing oil in underground rock formations is nothing new having developed about 40 years ago in Sweden, and it is said that there are presently underground storage facilities with a total capacity of several ten million kiloliters in northern Europe.

This storage mode is practiced not only in northern Europe but in the United States, France, and West Germany, and experience over the past 30 years has demonstrated its superior safety, environmental soundness, and economics according to the evaluations.

Underground storage facilities in Japan which have been used in the past include the facility constructed by the old naval technology branch which is still being used. There are small tanks embedded underground, but there have been no large underground storage tanks actually built, and nearly all of the large capacity storage tanks have been the above-ground type.

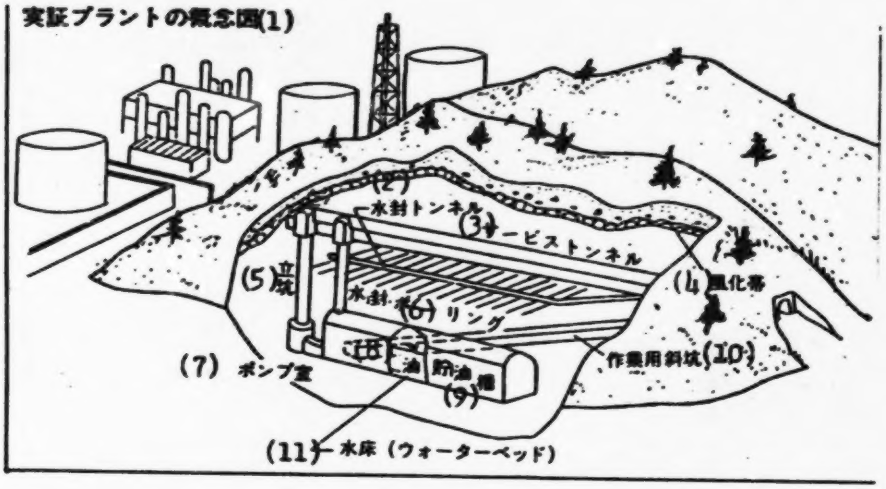
A storage base using this above-ground tank mode must be located near a good port and provide wide and level ground. Such a location is also suited to industrial belts or agricultural land, and its acquisition is becoming more difficult year by year.

With this background it becomes necessary to increase oil stockpiling capability as well as to plan effective utilization of the limited space available in Japan. To this end there is need to hasten development and utilization of a safe and economical storage method in addition to the above-ground tank method.

Because of this situation, the Resources and Energy Agency has since JFY 1981 been promoting survey research on technological development of underground oil stockpiling, assembling learned academicians and experienced specialists from private industry.

Types of underground storage of oil utilizing rock formations included the lateral boring water seal type, lateral boring Makitate /literally winding/ type, and rigid hole Makitate type. In JFY 1977 1) a large-scale oil stockpiling base model of 5 million kiloliter capacity for crude oil was proposed, an all country survey for suitable sites was conducted, and a number of potential sites were selected. In addition, 2) seismic observations were made in actual tunnels in line with earthquake resistant research, experiments using models to simulate earthquakes with an earthquake machine were conducted, and studies on behavior during earthquakes and on vibration characteristics were conducted.

Conceptual Diagram of Demonstration Plant



Key:
1. conceptual diagram of demonstration plant
2. water seal tunnel
3. service tunnel
4. aeration zone
5. vertical shaft
6. water seal boring
7. pump chamber
8. oil
9. oil storage tank
10. water bed (water bed)

The demonstration plant will have a capacity of 25,000 kiloliters and is comprised of a main excavation for the oil storage tank, service tunnel, dry pump room, vertical shafts for introduction and removal, and working tunnel for transporting mined earth. The storage tank which is the focal point of this system will be 15 meters wide, 20 meters high, and 112 meters long, and the top of the excavation will be 42 meters below sea level. The characteristic features are the water seal tunnels and water seal borings which will be deployed to cover the upper section of the oil storage tank in a rib bone affair. Introducing water through these tunnels and borings will create an artificial water table and is planned to complete the water tightness and prevent lowering of the natural water table. At the present time, construction of this demonstration plant has progressed to the extent that the working tunnels, water seal tunnels, and service tunnels have been completed, and the excavation for the main body is targeted to be completed by the end of June (see photo). At the same time, the stability of the rock formation, performance of the water seal, and effects on the environment will be studied through instruments installed in the two observation borings as one phase of this demonstration experiment, and studies on design values and the like will be conducted.

Future plans involve the completion of studies on the stability of the rock formation and the performance of the water seal. In addition, when construction of the demonstration plant is completed, inspections such as leak tests and tests involving water operation will be conducted after which oil-in will be performed (about January or February of 1982), and experiments in crude oil transport are planned.

At the time the safety and economics of underground tanks in the rock formation in Japan are demonstrated by this plant, it will represent a great step forward in the realization of actual large-scale underground oil stockpiling bases.

2267
CSO: 4105/205

END

JPRS 78931

9 September 1981

Japan Report

No. 134

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 78931

9 September 1981

JAPAN REPORT

No. 134

CONTENTS

MILITARY

JDA To Request 17 P-3Cs, 43 F-15s in FY 1982
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 1

JDA To Work Out Budget Request Soon
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 3

FY 1982 MSDF Shipbuilding Program, Prospects and Problems
(JPE AVIATION REPORT-WEEKLY, 19 Aug 81) 4

SCIENCE AND TECHNOLOGY

Japan's Petroleum Industry Said To Be at Turning Point
(ENERUGI FORAMU, Mar 81) 6

Petroleum Committee Chairman, Toshimitsu Fujita Interview
Companies' Strategies

Nation's Oil Strategy for 1980's
(JAPAN PETROLEUM & ENERGY WEEKLY, 20, 27 Jul 81) 19

Petroleum Alternatives Development Stepped Up
(JAPAN PETROLEUM & ENERGY WEEKLY, 27 Jul 81) 27

Early Introduction of Oil Standard Prices Delayed
(JAPAN PETROLEUM & ENERGY WEEKLY, 17 Aug 81) 31

Measures To Rehabilitate Coal Mining Industry Urged
(JAPAN PETROLEUM & ENERGY WEEKLY, 10 Aug 81) 35

Pratt, GE Seek Participation in RJ500
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 41

Advisory Body Favors Private Takeover of NAMCO
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 42

Y-XX Program Reported at Standstill
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 43

Sony To Promote Aerospatiale Helicopter Support
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 44

JDA, MITI Differ Over MT-X Contractor Selection
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 45

Nation Ready To Transfer Defense Technology to U.S.
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 47

ASDF To Consider New Support Fighter for FY 1983-1987 MTDP
(JPE AVIATION REPORT-WEEKLY, 5 Aug 81) 49

Top Executives of MDC, Fokker in Tokyo
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81)......................... 50

SJAC Assigns 12 Firms to 15 Research, Development Projects
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 51

Sumitomo To Export 767 Landing Gear Parts to CPC
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 53

NAL Tests Aileron for Stol Aircraft
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 54

JDA To Select MT-X Prime Contractor in September
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 56

Durability of H-1 Rocket's Combustion Chamber Proven
(JPE AVIATION REPORT-WEEKLY, 12 Aug 81) 58

ASDF Asks Three Firms for Badge-X Proposal
(JPE AVIATION REPORT-WEEKLY, 19 Aug 81) 59

NEC Named To Produce Nike Spare Parts
(JPE AVIATION REPORT-WEEKLY, 19 Aug 81) 60

MSDF To Delay Full-Scale Procurement of New K-X Mines
(JPE AVIATION REPORT-WEEKLY, 19 Aug 81) 61

MILITARY

JDA TO REQUEST 17 P-3CS, 43 F-15S IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 8-9

[Text]

The JDA has decided to request funding of 17 P-3C antisubmarine warfare aircraft and 43 F-15J fighter-interceptors in FY 1982, compared with the originally-planned 12 P-3Cs and 32 F-15Js. It will submit its budget request for FY 1982, including these aircraft, to the Ministry of Finance (MOF) late in August.

The increase in the P-3C and F-15J requests from the originally-planned levels is aimed at demonstrating the JDA's intention to meet the United States' demand for Japan's stepped-up antisubmarine and air defense capabilities as much as possible.

The JDA was authorized by the National Defense Council in December 1977 to procure 45 P-3Cs and 100 F-15Js, of which it obtained funding for eight P-3Cs and 23 F-15Js in FY 1978 and 10 P-3Cs and 34 F-15Js in FY 1980. As for the remainder, the JDA's original plan has envisaged 12 P-3Cs and 32 F-15Js in FY 1982 and 15 P-3Cs and 11 F-15Js in FY 1984. In the recent decision, five P-3Cs and 11 F-15Js out of the total for FY 1984 were added to the FY 1982 requests.

The JDA expects the MOF to approve the increased requests. If so, it would be able to complete funding of all the authorized 100 F-15Js in FY 1982. As to P-3Cs, only 10 aircraft would be left over to FY 1984. As the JDA intends to procure these aircraft beyond the authorized levels, the National Defense Council is likely to authorize additional procurement under the FY 1983-87 Medium-Term Defense Program to be prepared by the end of the current fiscal year.

The advanced P-3C and F-15J funding in FY 1982, if approved, could sharply increase disbursement in the following years. In general, appropriations for defense equipment in a year for ordering are far less than prices with full-scale disbursement left over to the following years. Down payment at the time of ordering accounts for only 1.45 percent of a full price for the P-3C and 0.79 percent for the F-15J, according to the FY 1980 budget. Thus, the advanced funding would not necessarily increase appropriations in FY 1982 by a big margine, but would boost follow-on disbursement sharply.

The JDA estimates the value of the P-3Cs and F-15Js for FY 1982 funding at more than ¥600,000 million. In FY 1980 prices, they are valued at ¥526,700 million -- ¥163,400 for the 17 P-3Cs and ¥363,300 million for the 43 F-15Js. But inflation and increased license production costs are estimated to boost their value to more than ¥600,000 million. Most of these aircraft for FY 1982 funding will be covered by license production which costs more than direct import from the United States through the Foreign Military Sales channel. Eventually, disbursement for these aircraft after FY 1982 would exeed ¥600,000 million.

Follow-on disbursement for all defense equipment, including ships, missiles, tanks and howitzers, as well as aircraft, totaled ¥610,000 million under the FY 1980 budget and ¥390,000 million under the FY 1981 budget. As to the FY 1982 budget, follow-on disbursement for P-3Cs and F-15Js alone would increase more than 1.5 times over the FY 1981 budget.

But the MOF intends to scrutinize the JDA's budget request in a bid to hold down follow-on disbursement as well as FY 1982 appropriations for its prime purpose of reconstructing the deficit-ridden national finance.

CSO: 4120/317

MILITARY

JDA TO WORK OUT BUDGET REQUEST SOON

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 p 8

[Text]

The Japanese Defense Agency (JDA) is expected to work out its budget request for FY 1982 by mid-August, prior to submission to the Ministry of Finance at the end of the month.

In the request, the JDA intends to hold the increase in FY 1982 appropriations to the government-set ceiling of 7.5 percent. But it will seek a huge rise in disbursements in following years mainly for defense equipment in a bid to accomplish equipment funding targets of the FY 1980-84 Medium-Term Defense Program ahead of schedule and to achieve the defense preparedness stipulated in the National Defense Program Outline by 1987, the last year of the new five-year program.

Equipment subject to the FY 1982 budget request will include 17 P-3C antisubmarine warfare aircraft for the Maritime Self-Defense Force (MSDF) and 43 F-15J/DJ fighter-interceptors for the Air Self-Defense Force (ASDF), which could require more than ¥600,000 million in follow-on disbursement. Other equipment requiring huge follow-on disbursements will be MSDF destroyers and other ships, improved Hawk missile systems for the Ground Self-Defense Force (GSDF), Tan-SAM short-range surface-to-air missiles for the ASDF and GSDF, air-to-air missiles for ASDF F-15Js and ammunition.

The JDA will also request a fast increase in research and development funds for both FY 1982 and follow-on disbursement.

As to personnel increase to meet a rise in equipment inventories, JDA head Joji Omura will consult with Prime Minister Zenko Suzuki and Administrative Management Agency Director-General Yasuhiro Nakasone before making a final decision, because any personnel increase could be affected by the Suzuki cabinet's high priority for administrative reforms to slash the total number of government employees.

CSO: 4120/315

FY 1982 MSDF SHIPBUILDING PROGRAM, PROSPECTS AND PROBLEMS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 535, 19 Aug 81 pp 9-10

[Text]

The Maritime Self-Defense Force (MSDF) is expected to request funding of 11 ships, including five destroyers, in FY 1982. Prospects and problems on these ships follow:

Destroyer

The MSDF may request four 2,900-ton DD and one 1,400-ton DE destroyers in FY 1982 and one 4,500-ton DDG guided-missile, two DD and as many DE destroyers in FY 1983 to accomplish a funding target of 16 destroyers (two DDGs, 10 DDs and four DEs) stipulated in the FY 1980-84 Medium-Term Defense Program (MTDP) one year ahead of schedule. In FY 1980 and 1981, one DDG, four DDs and one DE were funded. If the remaining 10 ships are approved in FY 1982 and 1983, destroyer funding from FY 1977 through FY 1983 would total 23 vessels -- 15 2,900-ton DDs, six 1,200-1,400-ton DEs and two 4,500-ton DDGs. As a result, DDs for three escort flotillas and DEs for two MSDF district commands will be modernized. DDGs will increase to six ships. DDs and DEs for funding after FY 1983 may shift to new performance-improved types to meet several operational requirements.

Submarine

The MSDF plans the remaining three out of the five submarines stipulated in the MTDP to be funded by FY 1983, instead of the originally-scheduled FY 1984. Two were funded in the first two years of the MTDP. It may request one in

FY 1982, and two in FY 1983 when more funds than the previous fiscal year could be set aside for ships with an aircraft request reduced.

PM-X

The MSDF may request one PM-X new patrol boat in FY 1982 after adopting the 260-ton slide type with a 18,000-horsepower diesel engine proposed by Mitsubishi Heavy Industries Ltd., which has turned out to be less costful than other candidates such as Hitachi Shipbuilding & Engineering Co.'s hydrofoil type and Mitsui Engineering & Shipbuilding Co.'s SWATCH (Small Waterplane Area Twin Hull) type. This is the test boat for evaluation incorporated into the FY 1980-84 MTDP. The boat, if funded, would be built by FY 1984. Weapons systems for it, including Harpoon surface-to-surface missiles, 76mm guns and Stinger portable surface-to-air missiles, will be requested in FY 1983. Evaluation of the test boat armed with these weapons systems may start in FY 1985 or later. PM-X's are designed to replace the existing five PT torpedo boats which will retire from FY 1986.

Minesweeper

The MSDF is hopeful of getting two 440-ton MSC minesweepers funded in FY 1982 because two were approved each in FY 1980 and 1981. The MTDP calls for funding of 11 such ships in the five years from FY 1980.

Surveying Ship

The MSDF plans to get two 1,100-ton AGS surveying ships funded under the current MTDP. A request for one of them in FY 1981 was disapproved. In FY 1982, this request may be renewed.

DSRV

The MSDF may request one DSRV (deep submergence rescue vehicle) ship in FY 1982 for mounting on a 3,600-ton AS submarine tender funded in the previous fiscal year. Evaluation of a test DSRV ship was completed in FY 1977, leaving no problem with the FY 1982 request.

CSO: 4120/308

JAPAN'S PETROLEUM INDUSTRY SAID TO BE AT TURNING POINT

Petroleum Committee Chairman

Tokyo ENERUGI FORAMU in Japanese No 315 Vol 27 Mar 81 pp 59-61

[Interveiw with Toshimitsu Fujita, Chairman of the Petroleum Committee, Liberal Democratic Party: "Now Is the Time To Revise Petroleum Industry Laws"]

[Text] The Problem Has Just Erupted

This Journal: There are presently large changes taking place to the basic conditions of Japan's petroleum industry. I feel that there are also some major shifts coming in Japan's petroleum policy framework. Can you give me some insight on the basic aspects of the situation?

Fujita: No matter how much the situation changes, the main energy source, at least for the remainder of this century, will have to be oil as far as this country with its low resources and energy is concerned, and this will be the basic premise on which future policies have to be based.

It has been said that our dependency rate on oil will be 50 percent in JFY 1990, but the absolute volume itself will represent an increase, so there will be a need to be assured of an even greater volume of oil than what we need today.

To this end, it will be necessary to alter our dependency on Middle East oil, which presently accounts for 70 percent of our import, and diversify the sources of oil as much as possible. Some specific sources are Mexico, Ecuador, North Sea, Indonesia, or the Senkaku Islands. In the particular case of the Senkaku Islands, there has been a survey conducted by the Prime Minister's Office since 1968. There are also the Japanese-Korean continental shelf, Sakhalin, and Siberia.

In this manner, we must transcend ideology and consider supply sources from all conceivable directions.

When we consider oil policy in such a light, it would mean a shift from our concentration on the Middle and Near East to a world-wide supply base. In order to abet this change, it is my belief that the petroleum industry laws which were enacted in 1962 need to be revised. This is particularly the case since the most recent situation is that the oil producing countries are considering a shift to products export, and the opportunity is ripe for reevaluation of the principle of consumer country refining. Such being the case, the oil industry laws which were formulated to promote the oil industry mainly through operating rights to purification facilities must probably undergo drastic reassessment.

At the same time, the environment surrounding oil is undergoing turbulent times while the administrative guidance of the Ministry of International Trade and Industry is becoming more complex and diverse, and this has conversely resulted in the surfacing of the extremely difficult situation involving the problem of Dokukinho [private monopoly laws]. In other words, we will have to decide just where to set the limits to free economy and administrative guidance.

Consequently, the end result may be diversification of import sources, promotion of development of Japan's surroundings, and reinforcement of stockpiling measures which will probably make up the central subjects in oil policies from now on. The western world is said to have more than 140 days supply of oil in their stockpiles, and the situation in Japan is such that the combined efforts of government and private sources have finally made possible a 100 days supply. Together with the 90 days supply for private use, a minimum of 30 million kiloliters needs to be stockpiled in this country.

This Journal: What is the situation when seen with respect to substitute energy?

Fujita: Coal has been highly evaluated, and there is talk that close to 20 percent of the total energy will be supplied by coal by 1990, but the problem here is the acceptance system. There has been no serious thought directed at just where and how coal centers and ash disposal will be assigned. It does not suffice to simply say that about 20 percent of the energy needs will be provided. There is also talk that nuclear energy will provide more than 10 percent and coal liquefaction about 6 percent, and this type of diversification needs to be actively promoted.

Now, if such comes to pass, I have concern in another direction in that where it was necessary up to now to ride herd over oil which was the pillar on which energy was based, the diversification in energy sources from here on may result in a very unstable situation.

This Journal: It has been said that the oil industry is in a state of excessive competition, and on this point...

Fujita: You are speaking, for example, about the transport of crude oil and products. This is being conducted in its entirety by each company by itself, and tremendous losses are involved.

Now, there has been talk of reorganizing the present 36 refining companies and 12 sales companies to something like the 9-company setup of the power companies, and this subject was hotly debated at the recent Asian Oil Association's Oil Capital Cooperative Session.

I believe that like it or not, there is inevitably going to be need to reorganize due to external factors.

In addition, there is the problem of excessive competition among the 59,033 gas stations and gasoline dealers, and it may be necessary to revise the gasoline sales laws to allow the stations to stay open on Sundays and holidays if they so desire, give relief through tax laws, or make some readjustment regarding fiscal problems.

The gasoline tax in particular brings in enormous revenue, yet except for some slight subsidies, very little is returned to the oil area, and this is an area in which the gasoline sales laws need to be revised.

This is why the revisions to government economic policies, administrative policies, and laws have suddenly become necessary. In addition to this situation, the sudden jump in prices of oil with the first and second oil crises have been external factors which helped greatly to precipitate this present situation.

Establishment of Import System Is Pressing Item

This Journal: In any event, what the problem boils down to is that the oil industry laws were enacted of the basis of availability of cheap and abundant oil, but we now have the contrary situation that these laws have become leg irons. With this in mind, how would you propose that the oil industry laws be revised to cope with the present situation?

Fujita: Since the war, there has been a gradual transition from coal centered energy policies to oil centered energy policies with 1960 being the approximate boundary of crossover, and this energy source may once again be switched back to coal. I have considerable concern over such a change. This is because there is a tendency to regard oil rather lightly under the disguise of energy conservation or disengagement from oil. There is need for awareness of the fundamental concept that oil is still the primary energy source. This has to be the premise on which the oil industry laws should be amended.

Since small refineries with a capacity on the order of merely 50,000 bbl/day are still in business under government sanction to provide this energy, there is some feeling in the industry that the government will come to the rescue in time of distress. I feel that any revision to the oil industry laws must eliminate such behavior. It is my belief that there has to be reorganization or a few companies of high performance which can even compete with the major ones through reinforcement with private capital.

With the exception of the agricultural products industry, all of Japan's industries have been able to excel in international competition, and there is no rationale for the oil industry alone to remain in its present state. There is need to strengthen the oil industry whether it be for modernization purposes, fiscal purposes, foreign relation purposes, or information gathering purposes. The situation at the present is that fiscal capital lurks in the background and is casting its shadow, but this is not the problem, and it is necessary for the oil industry itself to reinforce itself in power and in materiel. The direction to take may be to make selective revisions of the oil industry laws, otherwise there will be no way for the oil companies to reorganize.

This Journal: In that case, the focal point of the problem is whether to reorganize government leadership, including administrative guidance, or to reorganize private industry leadership, including the activity and creative forces of the private sector.

Fujita: I really believe that a completely free economy as such will not truly function in Japan. This is why government leadership will tend to end up in a regulated economy, and I am wondering whether a planned economy under private leadership and planned economy under newly revised oil industry laws are not possible. Would not leadership by the Ministry of International Trade and Industry be running counter to the times?

On the other hand, Japan has risen to the level that it is the world's second largest consumer of oil next to the United States, and external pressures have become fierce as a result of which government backup is vital. There is a need to mobilize private forces and activity to abet reorganization and modernization of the oil industry. The international battle cannot be won unless this course is followed. This is an extremely difficult problem.

That is why there may be no other way but to plan the economy of agriculture and the oil problem in a transitional manner for the time being. It would be fine if we get on track, but there is need for a certain degree of planned economy until then. It is from such a viewpoint that I would like to see this area excluded from the scope of the Dokukinho. This is where my views are in direct confrontation with those of Mr Hashiguchi, but there may be need for some kind of drastic treatment such as a temporary cessation of the Dokukinho.

This Journal: So now if we are to consider who has the power in such a situation, it would be the trading companies. The supply of crude oil has now passed from the hands of the major oil companies to these companies. At the same time, it is thought that the crude oil supply capacity of the major oil companies can be assessed to be of the same order. Where would you place such power in the new industrial system which you propose?

Fujita: Crude oil procurement actually has come to the stage that these companies are already handling part of it. Also looking at this country's situation for handling oil imports, these company dealings, GG (government to government) dealings, DD (direct dealing), and spot dealing present a very confusing situation.

This is why we would like to do away with spot dealings which are relatively higher in cost and unstable. GG was a failure in Mexico. I believe GG is doomed. This situation resulted when 21 companies jumped on the band wagon and decided to take a stab at it. It seems that Mr (Rokusuke) Tanaka recently went to plead for some increase in volume, but increases are hard to obtain. In this connection, it may be more effective to take the direction of enhancing DD rather than GG, and the government should provide fiscal backup in that direction.

Setting up a reinforcement for the import system is really necessary. For example, the Japan-Ecuador Cooperative which I chair is concerned with Ecuador where it has been known for sometime before there is oil. Even before I became president of the oil problem survey committee, there were queries from the Ecuador ambassador whether Japan would buy some Ecuador oil. Now, a certain oil company teaming up with certain commercial companies secretly imported 15,000 bbl/day. Such selfish acts are bad for the overall picture. Where we had proposed 30,000 bbl/day, the wish was to extend this to 50,000 bbl/day. On the other hand, there was a long-term plan to establish medical treatment facilities in Ecuador.

It has been said that Japan has too many refineries and crude oil dealers. If we now reduce the number and concentrate refining efforts and go to DD while eliminating import reporting systems and tightening up the overall system, the resulting reinforcement of the import system may be a necessary step.

If there is too much attention directed to GG dealings, there may be suspicion that such projects are being conducted in order to make money with government funds, and here again a problem is created.

The problem of revision of the oil industry laws is something which I hope will be realized in one way or the other in the year or so I have left as chairman of this oil problem survey committee. I am speaking now with stimulating tones hoping to create such a mood (laughter).

Political Truce on Energy

This Journal: The energy problem including oil is a very large problem involving assurance of national safety, and we would like to see a basic consensus which overrides all party factions.

Fujita: I read the February issue of Energy Forum (Editor's note: "Total Safe Assurance of Energy of all Parties") and Mr Shintaro Anbai (my party) and Mr Osamu Takefujiyama (Socialists) are in general agreement.

This is why I want to promote energy policies, particularly the promotion of nuclear energy, on a bipartisan basis.

In this vein I wish to see a political truce with regard to energy policies by 1990. Since a nation's life is very long, let us get together on this one subject casting all ideologies aside to promote this program wholeheartedly. That is the movement I wish to foster. We will be hurting unless we do so.

Where energy and food are concerned, Japan will be in perilous state unless the factions can come into agreement. I truly want to promote energy from the standpoint of a political truce.

Companies' Strategies

Tokyo ENERUGI FORAMU in Japanese No 315, Vol 27 Mar 81 pp 62-67

[Special Report: "Petroleum Industry Heading Toward Energy Conglomerates"]

This has long been called the age of uncertainty and the prospects for introduction of nuclear power, coal, and geothermal type substitute energy are extremely difficult. Looking just at coal, not only is the combustion of raw coal being promoted as well, but even the specialist in the field cannot hazard guesses as to which energy source will at what time become available at what price and what scale on the market.

At present, the Iran revolution of 1979 has been the wedge which saw the price of oil climb sharply in no time from 20 to 30 dollars/bbl, and we are now at the verge of breaking the 40 dollar/bbl level.

In the midst of this turmoil, the need for substitute energy has become apparent once more, and not only the side issue of safe supply but the price issue have become subjects of reawareness.

Japan's industrial world is becoming more aware of this perilous situation as evidenced by "if the price of oil keeps escalating at this pace, we will be unable to stay in business" (cement industry), and the movement to disengagement from oil (mainly conversion to coal) is taking place starting with industries in which conversion can be realized more readily headed by the iron and steel industry and the cement industry from last year.

On the other hand, such moves conversely invite reduced oil consumption. The rise in energy conservation awareness in answer to increasing prices and the decline in prosperity which has enveloped the United States and the EC have also joined to cause reduction in oil demand. For example, let us look at C grade oil which has been termed industrial use "bread." The consumption of C grade oil in Japan for September of 1979 was about 7.2 million kiloliters, but one year later in September, 1980 it was 5.76 million kiloliters. This was a decrease of about 25 percent, and it may be safe to say that there was an average 20 percent decrease in demand.

Should this trend continue in the future, the party which would be in greatest jeopardy will be the oil companies. To be sure, the sharp rise in price is the most pressing problem, but this is an indication that the participation in substitute energy endeavors is the pressing subject on a medium and long-term basis.

The "World's Energy Prospects" published yearly by the leading international oil industry Exxon in its 1981 edition indicated that Japan's dependence on imported oil is expected to decrease from the 73 percent in 1979 to 54 percent in 1990 and to 43 percent in 2000, and the actual volume will be of the order of 5 million bbl/day in 2000 thereby suggesting that Japan's import will be crawling laterally. The "1990 World's Energy Forecast for 1990" put out by the Japan Energy Economic Institute also predicts Japan's dependence on imported oil to be 58 percent in 1990 (this is 4 percent higher than the Exxon estimate).

What becomes evident from these data being released presently are 1) there can be expected no increase in imported oil from here on and 2) despite this situation, energy demand is expected to increase by 2 percent. In such a situation, there is a feeling "substitute energy development needs to be aimed at 10 to 20 years in the future" (president Ohori of the Petroleum Cooperative) that is increasing within the ranks of the oil companies.

This is something which not only those private industries such as Shukko are involved in but companies such as Nippon Oil and Exxon which heretofore had not lifted a finger in this direction are now pouring capital into substitute energy development, and this is an item of note.

Private System also in Do or Die Situation

Engagement in new energy endeavors is also taking place within the private industry system. One item of note is the "New Energy Policy Committee" set up by Kyodo Oil Company which started functioning in January of this year. Kyodo Oil's participation in substitute energy has been delayed in the past, and this is its answer to seeing large users of its C grade oil shift to coal and other energy forms. Just which area this company will first venture into is not known as yet, but it seems to be studying directions to follow after analyzing the situation with respect to conversion to other energy forms besides oil and evaluating trends in new energy sources. Kyodo Oil got its start under the sponsorship of the Ministry of International Trade and Industry, and its interest in the new energy area was very low in the past, but it may be said that the wave of the times also engulfed Kyodo Oil such that it now has great interest in the new energy area.

In another direction, if one were to point out a true protagonist of new energy development from the ranks of private industry, it undoubtedly will be Shukko Kyosan. Since Shukko established its "New Energy Office" in 1977, it has spearheaded Japan's efforts in the substitute energy race in the three directions of coal, uranium, and geothermal sources.

In the area of coal, this company was the icebreaker of Japan's oil industry to initiate import of general coal from Australia starting last year. It has been conducting analysis via artificial satellites and airplanes in the area of geothermal development, and it will begin borings at 11 sites including the Yoshifu-machi area in Kyushu sometime this year. It is also engaged in joint participation with the Uranium Gesellschaft of West Germany to develop uranium mines.

In addition, Shukko is also engaged in research on methods of extracting butanol from plant fibers to be used in the production of gasohol and is also planning to enter oil shale and soil sand development. It may be said that Shukko clearly is planning to develop into an integrated energy company.

We next look at Daikyo Oil which was embroiled in a capital cooperative problem with Asia Kyoseki which in July of last year opened its "Coal Business Office" and has been engaging in import and sale of imported coal. This company will establish its new "New Energy Committee" the next year. This committee will be the inquiry organ for this company's board of directors and will look into not only coal and coal liquefaction but oil shale and oil sand through respective working groups and will involve the whole company in studies on new energy.

The next company is Asia Oil which entered into a new cooperative relationship with Daikyo Oil. This company entered into an agreement at the end of last year to supply domestic coal mined at the Sunagawa Mine of Mitsui Mining Company to the Kamiiso plant of Nippon Cement located in Hakodate. The quantity to be supplied is rather small and of the order of 20,000 tons per year, but it features the purchase and trade of domestic coal which is readily obtained. The reason Asia Oil is engaged in this business is that the Hakodate plant of Japan Cement has a direct pipeline from Asia Oil's Hakodate Refinery through which it has been receiving C grade oil. Since Japan Cement had been planning a switchover to coal, In addition, Maruzen Oil which is also another private oil company established its "New Fuel Office" in March of last year and has been engaging in handling new energy development centered on coal but it is also studying a diversity of new energy sources such as biomass fuel as well. Another joint business is coal liquefaction following the process developed by Gulf Oil of the United States in which a three country cooperative effort between Japan, United States, and Germany is being promoted, and the "Japan SRC" which will be this cooperative's window in Japan was formally established. This new company has as its nucleus the five companies of Mitsui Coal Liquefaction, Nippon Steel Company, Daikyo Oil, Nippon Mining, and Maruzen Oil. On the other hand, there are rumors that the West German and American governments will be cutting off their financial support, and there is some confusion.

As a result, projects such as the "Japan Coal Liquefaction Technology Development" based on the Exxon method (with participation by 12 companies including Esso, General Oil, Toa Fuel Industry, and Shukko), the peat liquefaction project in Victoria Province of Australia which is a joint project of Shukko and Asia Oil, and the Mitsubishi Group liquefaction business based on the Mitsubishi Solvolysis method with participation by the Mitsubishi Group are seeing the activities toward new company establishment running into a dead end.

Leaving aside the case of the Mitsubishi Group which is comprised of all domestic companies, international projects to which funds have been advanced have come under question by certain oil people as to just how much merit there is in such an approach. The Japanese companies do not have the capacity to come forth with large sums of money like the majors, and they are hard put just what to do with what little they have. Even then externally financed systems have the advantages of using the large pipes of the majors as lever to serve to good use both in know-how and in fiscal matters. Conversely, the new energy strategy of these private companies need to come up with a few schemes of their own.

New Strategy of Trading Companies Which Have Come to the Fore of Oil Procurement

"Dantotsu Mitsubishi" Gambles on Pursuit

"Sumitomo Shoji Incident"

There are some extradordinary events taking place among the large trading companies. Total sales is the index by which the might of an integrated trading company is assessed, and the underlying factor of these disturbances is that there is the possibility that the order in total sales rank for this year's March term may be altered. The eye of this typhoon is Sumitomo Shoji Kaisha. This company presently is fifth in order to total sales. In the intermediate compliation of last September, Sumitomo Shoji was just nosed out by Marubeni. Where Marubeni chalked up sales of 4.7214 trillion yen sales, Sumitomo Shoji accounted for 4.704 trillion yen for a differenceof but 17.4 billion yen. If Sumitomo Shoji had sold one more large tanker load of oil to a small plant, it would have overtaken Marubeni. Whether Sumitomo Shoji can displace Marubeni is the next compilation of the topic of discussion.

Where the sales of the nine large trading companies in last September's interim compilation increased by 28 percent over the same period the previous year, Sumitomo Shoji increased by 42 percent. When these increases in sales of this trading company were broken down into respective areas, chemicals and fuel increased by 74 percent, machinery by 46.5 percent, metals by 30.6 percent, and food and food products by 22.1 percent, and the chemicals and fuel area showed an overwhelmingly greater increase.

The increase in the fuel business is particularly large even within its own area, and sales of fuel which totaled 479 billion yen for the September 1979 period increased 91 percent in the September 1980 compilation to 905 billion yen. This shows how much this expansion in Sumitomo Shoji's trade has come from the increase in its oil trade.

"Afraid to take a risk." The trade policy of Sumitomo Shoji until very recently was categorized in this manner. An integrated trading company, like a goby, will stick its neck out in any direction in which there is possible trade. It will handle cheap items such as instant noodles or pantyhose to very high priced items of the nuclear reactor and missile class.

In such a situation, Sumitomo Shoji stood out in that it absolutely would not involve itself in any business where great risk was involved. This company was well fixed where real estate was concerned, and because of this fixed income, it could survive without having to venture into risky businesses, which was one factor dictating such a practice. In addition, the Sumitomo family has had a long standing policy of "no pursuit of floating gains," and it has a practice of not engaging in business of poor performance as other trading companies.

Now, the trading practices of Sumitomo Shoji underwent a complete turnabout last year. Particularly in the energy area, Seiji Hasegawa, chief of the Fuel Headquarters, became the central figure in developing trade methods completely different from what Sumitomo had conducted in the past and even extending its hands to become a trader in crude oil through the medium of its American Sumitomo Shoji as the prime figure. The interim compilation of September showed its three-country trade to be 2.4 times the previous year's total, and this performance clearly describes the all-out trading of crude oil by Sumitomo Shoji on a three-country basis.

Sewing Up Gaps Left by Retreat of the Majors

The second oil crisis accompanying the Iran revolution was the opening which prompted the integrated trading companies to enter the energy field wholeheartedly. The power of the international oil capital (majors) began to decline ever since the Iranian revolt, and direct sales (DD) of crude oil on the part of the oil producing governments increased. As a result, the Japanese oil refiners who had been buying their crude oil from this international oil capital lost their supply source for crude oil in the guise of the majors, and they had to go out and procure the oil themselves.

Such being the case, there was no one with enough authority to fly to Iran or Saudi Arabia and purchase their oil, and they were rather low in funds. Excluding Shukko Kyosan, which had had company members in residence in the Middle East ever since the first oil crisis, nearly every trading company had no recourse but to contract with the trading companies to import their oil.

Import of crude oil was right up the alley of the trading companies because they had a number of company people living in the oil producing countries who could also speak the language. At the same time, they had connections with government inner circles, and they managed to get fast decisions. Furthermore, these trading companies were blessed with enormous capital, and the financially hard-pressed oil refining companies even could use some of this trdining company's financial assets. The volume of crude oil handled by these trading companies increased sharply inthis manner, and the fraction of crude oil supplied by these trading companies and foreign oil companies varied in the manner shown in the following table:

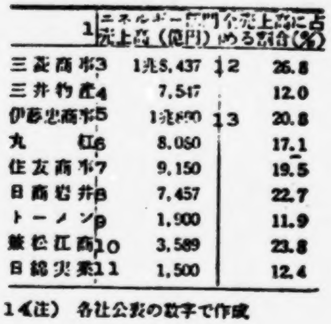
	(1) 外国石油会社	(2) 商 社
(3) 50年度	62.6%	17.5%
51 〃	62.6	22.1
52 〃	59.7	23.9
53 〃	54.7	26.4
54 〃	43.0	32.4

Key: 1. foreign oil companies 2. trading companies 3. JFY 19--

Data for JFY 1980 are not established as yet, but the volume fraction handled by these trading companies had approached 40 percent, and there is every indication that the share of the crude oil market on the part of the foreign oil companies may drop below 40 percent. As long as we limit ourselves to just crude oil supplied to Japan, it can be said that the powers of the majors and the trading companies are headed in opposite directions.

Kyushu Oil had been purchasing Iranian crude oil from British Petroleum so that it was quickly cut off from the majors' supply at an early stage. This was why this company started to buy its oil from the trading companies and it now "lets the trading companies fight among themselves as they supply us with most of the oil we purchase" (top echelon member of this company).

Ever since the Iranian revolution, the trading companies have been trying to establish themselves as the "Japan made majors," and the sales total of the nine large trading companies in the statistics for the September quarter of 1980 was as follows:



1	エネルギー部門売上高（億円）		全売上高に占める割合（%）2
三菱商事3	1兆8,437	12	26.8
三井物産4	7,547		12.0
伊藤忠商事5	1兆890	13	20.8
丸紅6	8,060		17.1
住友商事7	9,150		19.5
日商岩井8	7,457		22.7
トーメン9	1,900		11.9
兼松江商10	3,589		23.8
日綿実業11	1,500		12.4

14（注） 各社公表の数字で作成

KEY:

1. Sales in the energy area (100 million yen)
2. Fraction of total sales (%)
3. Mitsubishi Corporation
4. Mitsui and Co., Ltd.
5. C. Itoh and Co., Ltd.
6. Marubeni
7. Sumitomo Shoji Kaisha, Ltd.
8. Nissho-Iwai Co., Ltd.
9. Tomen
10. Kanematsu Gosho, Ltd.
11. Nichimen, Co., Ltd.
12. 1.8437 trillion
13. 1.890 trillion
14. (Note) compiled with data supplied by each company

The order of these trading companies is by total sales, but the total sales in the energy area differ widely. The order is Mitsubishi first, Itoh and Company second, Sumitomo third, Marubeni fourth, Mitsu fifth, Nissho-Iwai sixth, Kanematsu-Gosho seventh, Tomen eighth, and Nichimen Company ninth. When ranked according to fraction of total sales, the four companies of Mitsubishi, Kanematsu-Gosho, Nissho-Iwai, and Itochu all showed over 20 percent making it evident that these trading companies are concentrating on energy.

Conversely, Mitsui and Company, Tomen, and Nichimen Company run about 12 percent, demonstrating that they are considerably behind in the energy picture. In the particular case of Mitsui and Company, it lags behind at about 5 percent in the energy field, and it is in no position to attack Mitsubishi or Itochu.

Mitsubishi's Potential Leads All Others

There is considerable background to Mitsubishi's rise to eminence in the area of energy. One of these is the fact that of all the large trading companies, Mitsubishi alone has an "oil import authority." While an authority such as oil import authority is nonexistent, the Ministry of International Trade and Industry has been applying the oil industry laws to its own ends to allow only the oil companies and Mitsubishi alone to import oil, and this is the origin of this term. There is no question but that the oil import authoirty held by Mitsubishi has been a responsible factor for its active participation in oil deals.

The other trading companies are limited to some substitute means of importing oil, and the odd situation has resulted in that "it is the trading companies which make the money transaction with the oil producing companies, but the oil companies are the ones engaged in the handling of the oil" which defies common sense.

One other factor is that Mistubishi Shoji had been actively engaged in oil transactions even in the days when oil was plentiful. A large number of people were engaged for a long time in nurturing Mitsubishi Headquarter's history in oil. Vice-president Keizoryo Yamada is the top mentor of this company's energy area, and he has many connections with the majors. There are the No 1 Fuel Department (department head, director Kiyoshi Hama) which handles oil and the No 2 Fuel Department (department head, director Tadao Matsuda) dealing with LNG which come under this headquarters, and these areas are being controlled by able oil men.

In addition, Mitsubishi Shoji has long been supplying Mitsubishi Oil with its supplies of oil, and this relationship has added stability to Mitsubishi Shoji's energy situation.

Companies Developing Independent Strategies

Itochu (C. Itoh and Company) also has a long history in the energy area. On the other hand, it made a major slipup in its handling of the Toa oil problem and the former chief of its energy headquarters director Tomoiki Takahara was shifted to a post as resident manager of Toa at Cairo last spring in taking responsibility for this slipup.

Presently, vice-president Minosuke Matsui is acting as provisional head. Vice-president Takao Kanai who had retired as president of Toa Oil and had served a stint at the Ministry of International Trade and Industry is also an able man in the oil area.

Although Itochu met with disaster in the Toa Oil case, it was highly successful in other ventures including Indonesian oil development. This company is now seeking the LNG project. Mitsubishi Shoji realizes a profit of more than 20 billion yen from its Brunei based LNG fields, and Nissho-Iwai and Mitsui Bussan also are promoting LNG development. This is why Itoh and Company which ranks No 2 in the energy area is in dire need of engaging in the LNG project, and president Seika Tozaki himself makes frequent trips to producing countries such as Katar to promote this cause.

Nissho-Iwai is next in line to Mitsubishi and Itochu in its activities in the energy area. This company will import 8 million tons of LNG from its Indonesia plant this year. It surpassed long standing Mitsubishi and vaulted forth to No 1 rank in LNG import.

The energy area is headed by chief of energy headquarters, director Eichiro Koizumi while developmental problems such as those involving development of the Senkaku Islands area are being handled by director Masao Araki. The volume of oil this company handles is not very great, but it is also planning new developments in Canada where LNG is concerned, and there are prospects for considerable increase in its LNG capacity in the future.

Its sales volume also is not that great, but Kanematsu-Gosho is all out in the energy area. The fraction of total sales accounted for by energy is second only to Mitsubishi indicating its large efforts in the energy area despite it being one of the small training companies.

This company has the advantage of possessing a number of product tanks within the country. It developed from small trade involving the narrow areas between the large trading companies to emerge as a major business.

President Iwao Matsurra died suddenly last November and director Hideo Suzuki ascended to the presidency in December. Mr Suzuki had been handling energy affairs from the time he was a director, and the Fuel Headquarters under chief Keiji Oda has begun to function actively with the provisional leadership of president Suzuki.

Marubeni is concentrating on DD crude oil and LPG import. Its energy sales ranked below Sumitomo Shoji in the interim rankings of September, but this company is more capable than Sumitomo where oil trade is concerned. The energy area is being handled by vice-president Kazuo Haruna who aspires to be the next president, and director Isao Hiroe head of the Energy Headquarters handles the actual work, and this head himself is making the rounds of the oil producing companies in order to handle top trade talks.

Mitsui and Company retightened its belt last year. It reorganized its energy setup, and director Kanji Kawanishi became head of the Energy Headquarters and joined in concert with vice president Shinzo Tsutsui to promote sales strategy to overtake Mitsubishi. It is aiming for expanded crude oil and LNG dealings involving outfits such as the Iranian National Oil which has deep roots in Iranian oil.

Tomen and Nichimen are continuing their strategies to make up in the 80's their delays of the 70's.

2267
CSO: 4105/209

NATION'S OIL STRATEGY FOR 1980'S

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Nos 29, 30; 20, 27 Jul 81

/For Parts 1-4 of this article please see JPRS 78806, 21 August 1981 No 132 of this series pp 7-20/

/20 Jul 81, pp 4-7/

/Text/

V. Functions and Nature of the Japanese Oil Enterprises (continued)

(1) Appraisal of the Petroleum Enterprise Law (continued)

It remains a fact, however, that free competition has not been fully implemented under the law, and as a result, even today the so-called "self-reliance principle" has not been thoroughly applied.

(2) Measures for the Age of Qualitative Substantialism

The above discussions notwithstanding, the oil industry today is clearly in a transitional phase from quantitative expansionism to qualitative substantialism. The oil enterprises are thereby pressed to cope with this transformation taking place in the industry.

Needless to say, in principle, it is up to the oil enterprises themselves to exert efforts towards this transformation. Yet in numerous cases it is difficult to deal with such problems on individual efforts alone. From this point of view, group formation has been promoted within the industry. But in a period of qualitative substantialism, even more diverse measures are demanded. In addition to group formation, it is most desirable to develop multifaceted, multilayer cooperative and coordinative relations between individual companies in each area of operations (such as crude oil purchase, residual oil cracking, new energy development, etc.). Indeed such moves are gradually being taken today. And it will be imperative for the government to lend appropriate support to such movements.

With regard to refineries connected to industrial complexes - referred to as "combinato refineries" -, it is commonly considered that their continuation should be sought on the principle of coexistence and coprosperity with the demand side. Depending on the circumstances, however, the need is also seen for these refineries to depart from purely supplying their fuel oil/feedstock to neighboring industrial complexes.

In addition, in terms of mid- and long-range energy demand trends, it is indispensable to continue making efforts toward "overall energy enterprise formation."

(3) Streamlining of the Business Management Environment

For the foreseeable future, oil will continue to occupy the prime position in the energy supply picture, and the oil enterprises will be compelled to bear the heavy onus in numerous aspects such as oil development, stockpiling, etc. As a result, sufficient consideration must be given to the adjustment of the business management environment as needed to permit the formation of "strong oil enterprises."

In this respect, it is only natural that rises in crude oil prices be passed on in appropriate measure to the consumer through proper product price increases. For ethical considerations, so-called "me-too" price hikes, however, must be avoided; and yet due recognition must be paid to the fact that corporate efforts alone by no means have been able to cope with the crude oil price rises implemented since the first oil shock.

In tandem with rises in oil prices, a stupendous rise has also been seen in the dollar usance figure with its balance totaling 3-4 trillion yen, and gains or losses resulting from fluctuations in the yen exchange rate have been abnormally high. Not only do such trends render normalization of corporate management extremely difficult, they also serve to give rise to erroneous judgments by the general public concerning the oil enterprise management situation. To cope with this state of affairs, a variety of countermeasures are seen to be desirable, such as creation of a reserve fund system, a yen shift from dollar usance, etc.

In addition, at present a broad variety of taxes are levied against oil. The need exists for constant review of the suitability of the degree of such impositions, the uses for which such moneys are spent, etc.

(4) Crude Oil Price Gap

Since the Islamic Revolution in Iran, a breakdown has taken place in the earlier uniform price structure among OPEC members. Owing to the fact that the major portion of crude originating from Saudi Arabia - which maintains the lower end in the new price structure - is supplied to Japan through the so-called "Aramco route," a substantial price gap has opened between the Aramco Group oil companies and those of the Non-Aramco Group. This gap, moreover, cannot be overcome through the efforts of the oil companies alone, and fears have arisen of the loss of competitivity.

However, the countermeasures available to deal with this problem are quite limited:

(i) At present, a return to a uniform OPEC pricing system is fundamentally outside the means of the oil-consuming nations. Furthermore, a considerable length of time is seen to be necessary before such a return could be effected.

(ii) The possible adjustment of the crude oil procurement costs through such means as institution of granting "adjustment funds" gives rise to fears of fierce protests on charges of administrative intervention. Such a move is also feared to produce adverse effects on crude oil supplies to Japan through the major oil companies, as well as on the negotiating stance assumed by the Japanese oil companies in their dealings with the oil-producing nations. In general, the implementation of adjustment funds is feared to encourage sharp increases in crude procurement costs.

(iii) Engaging in administrative intervention in product pricing as a means of ensuring the survival of enterprises saddled with higher crude oil procurement costs can be expected to invite strong public criticism, and such a measure is likely to be permitted only in the event of an extreme emergency.

The solution to this problem is thus by no means simple. The only available alternatives are either to strive to reduce procurement costs through normalization of the oil companies' crude oil selection or to urge the oil-producing nations to reduce their premiums. Otherwise, there would be no appropriate measure except securing crude oil from those oil-producing nations maintaining a lower price policy and equitable allocation of such crude among companies involved.

Note: It has been pointed out that the petroleum tax - currently an ad valorem tax - is creating an increasingly larger price gap between the Aramco Group companies and the Non-Aramco Group companies, which demands correction.

VI. Topics Related to Technology, Plant Facilities and Plant Siting

(1) Increased Supply of Middle Distillates

The greatest topic of concern in the areas of technology and plant facilities today is the achievement of expansion in middle distillates supply. As short- and mid-range measures, the need is seen for aggressively carrying out improvements in the operating conditions of existing facilities, introduction of residual oil cracking facilities based on existing technologies, review of the current product specifications, etc.

Note: In areas other than plant facilities and technology, among measures under consideration are conversion from middle distillates to other products where middle distillates are currently being used, conversion of crude oil burning to fuel oil C burning, import of middle distillates, export of fuel oils, etc.

Note: On the subject of conversion of crude oil burning to fuel oil C burning, it is pointed out that certain limitations exist relating to environmental and cost factors.

(2) Promotion of Residual Oil Cracking for Increased Production of Middle Distillates

Mid- and long-range measures for increasing supply of middle distillates include R&D on residual oil cracking and construction of cracking facilities. In R&D, cooperative work is already being carried out by related enterprises, with completion of such R&D anticipated over the next year or two.

A major topic for the future is the promotion of plant and equipment investments aimed at commercialization of such technological R&D. Viewed in the long-run, the most effective incentive for promoting such plant and equipment investments may be said to make products produced from such facilities - i.e. middle distillates - attractive ones in terms of profit generation.

However, sudden implementation of such measures is certain to invite strong public criticism. From this standpoint, on the subject of commercialization of residual oil cracking, it is seen to be necessary to follow a "multi-visional" policy during the period in which efforts are continued to introduce a price mechanism-activated incentive, until such efforts bear fruit.

(3) Added Flexibility in Facilities Regulations

As the period of quantitative expansionism now approaches its end, that part of the Petroleum Enterprise Law which deals with regulations on atmospheric crude oil distillation facilities creates no problems owing to the loss of the desire by refiners for capacity expansion of facilities. The part of the law relating to reforming and cracking facilities would be applied to permit maximum flexibility and elasticity, in principle. From the standpoint of maximizing the supply of middle distillates, it will be necessary to take some directional adjustments of these regulations to meet the new situation calling for an increased production of middle distillates.

(4) Measures to Deal with the Oil-Producing Nations

Looking ahead, it is most desirable to take aggressive actions to deal with the oil-producing nations through the technology and plant facilities aspects. First, it will be necessary to promote transfer of downstream operations technology to these nations. While transfer of such sophisticated Japanese technology as residual oil cracking, desulfurization and computerized process control can contribute to economic development in the oil-producing nations on the one hand, it is believed that this transfer will create the possibility of reasonable product imports into Japan, on the other. Much expectation is held in this respect in the "Oilman Center" (tentative name) to be established shortly.

Note: Other related topics for the future include attainment of overseas sites for residual oil cracking facilities and international development of Japan's oil refining industry.

The second action which can be taken is cooperation with oil-producing nations toward quality improvement in extra-heavy crude. While such improvement adds greatly to a stable crude oil supply, carrying out such improvement in the oil-producing nations has especially large merit in terms of the economy of scale derived therefrom and the procurement of inexpensive hydrogen gas. For this reason, aggressiveness in this direction by the oil companies and governmental support and assistance are highly desired.

(5) Development and Introduction of New Fuel Oils

The majority of new fuel oils - liquefied coal oil, shale oil, tarsand oil, alcohol fuel, etc. - can be mixed with oil products and used. In view of their potential contribution to the expansion of oil supply flexibility, their development and introduction must be wholeheartedly promoted.

/27 Jul 81, pp 7-9/

VII. The Role of Price Mechanism

(1) Fluctuations in the Oil Product Pricing Structure

In principle, the Japanese oil product pricing structure incorporates higher pricing for "clean products" and lower pricing for "dirty products." At certain times, however, salient fluctuations are seen. For example, from ca. 1955 until the late sixties gasoline long continued to bring a price below that of middle distillates. Also, following the first oil crisis, full-scale governmental intervention was carried out in the pricing system and middle distillate pricing was set at an extremely low level. Most recently, such forceful intervention in the product price structure has been averted, with the emphasis instead being placed on conducting checks aimed at eliminating opportunistic price hikes. In addition, it is frequently indicated that as a result of the long-term continuation of price rises by uniform margins for all products, the fuel oil prices have risen to a relatively high level, thereby causing fuel oil C to lose its competitiveness vis-a-vis alternative energies, giving rise to the so-called "fuel oil C bottleneck."

It has also been pointed out that, while demand for middle distillates is increasing, the incentive to supply such fuels is not keeping pace in terms of price level.

(2) Views on Product Prices

The following viewpoints may be set forth in considering the petroleum product price levels or price structure:

(i) Supply-Demand Conformity

At times such as the present when the product-by-proudct demand imbalance grows marked in relation to supply-demand trends, it would be most effective for supply-demand conformity to be determined by the pricing mechanism.

(ii) Consideration of People's Livelihood

The opinion is strongly voiced that consideration should be given to implementing a policy on the price level of items deeply affecting the people's living modes, such as kerosine.

(iii) Crude Oil Supply Security (Attractiveness of the Japanese Market)

If oil product prices are kept under rigid restraint, then the Japanese market will inescapably lose its attractiveness and the major international oil companies will lose their desire to keep this market in full supply.

(iv) Financial Structure of Oil Enterprises

An unnaturally imposed lowering of oil product prices will weaken the financial structure of oil enterprises, thereby preventing activities in such areas as oil exploration and development and oil stockpiling.

(v) Coexistence with Demand Industries

Due consideration should be given to the problems of concern by the demand industries (e.g., their competitiveness on the international market) and a policy of prosperous coexistence should be pursued.

(3) Supply-Demand Conformity Based on the Price Mechanism

When considering the appropriate oil product pricing structure for the future, it is necessary to give weight to the viewpoint that supply-demand conformity should be based on the price mechanism. In particular, much emphasis should be placed on the price mechanism in order to overcome the "fuel oil C bottleneck" arising under the marked imbalance in supply and demand and to expand the supply of middle distillates.

From this standpoint, in normal times it is highly desirable to pay utmost attention to the market conditions; and in times of market tightening it is best to avoid intervention in the pricing system - even while checks continue to be conducted to eliminate opportunistic price hikes. If intervention into the product price structure were carried out, then an incentive other than in the price mechanism would be needed in order to promote the supply of middle distillates. A strong governmental assistance policy would become necessary.

Note: It has been remarked that if good-quality fuel oil C for power generation, for example, were supplied at a price on a par with that of an equivalent quality crude oil, the possibility of a demand increase for fuel oil C would arise. This argument is refuted, however, by those who believe that major difficulties would be engendered from the supply cost aspect.

(4) Relation with Imported Products

One of the foremost problems encountered when considering petroleum product prices is the question of competitiveness against imported products. In particular with items largely supplied through imports, the view is expressed that competitiveness with the imported items must be promoted and a price structure created which reflects trends in the international market price.

On the other hand, oil products are multi-products, and even if competition from imported products becomes intense in a specific area, there is a limit to the production cutback which could be carried out on the item concerned; it would be necessary to obtain compensation from other products for the losses incurred from such competition. In this respect, if imported products are permitted to have too great an influence, then the potential for great turmoil arises in the product price structure. Furthermore, it is unrealistic to consider carrying out totally free product imports at a time when appropriate government controls are being sought on oil imports including both crude oil and products (incl. LPG).

Still, in cases such as that of naphtha - the demand industry facing harsh international competition - due consideration must be given to international pricing from the standpoint of the oil industry's coexistence with the demand industry. For example, while on the one hand mutually guaranteeing domestic consumption and stable supply for that portion of the product suppliable domestically, at the same time discussions among all parties concerned should be continued on the pricing of the product, with optimal consideration also given to the international pricing; for the imported portion over and above the domestic production, one possibility would be to implement a method of free selection on the demand side.

Note: With regard to naphtha imports, on the one hand the opinion is expressed that such imports should be completely free and the domestically supplied product price should be made to reflect the international price. On the other, the opinion is also heard that the oil companies should provide a uniform supply of domestically supplied product and imported product in view of the circumstances under which industrial complex-affiliated refineries came into being, etc.

Conclusion

As seen above, the new oil policy or new oil industry structure is in a reconstructional transition phase from "quantitative expansionism" to "qualitative substantialism." Furthermore, the design envisioned for the future will likely require revisions in accordance with changes in the situation. In this respect, at present there is an indispensable need for distinguishing between "prudence" and "boldness." For example, it seems most appropriate to avoid making hasty revisions in the Petroleum Enterprise Law while continuing to undertake careful study of possible future implementation. Also, with respect to the oil product price structure, it would seem to be necessary to give full weight to the view that supply-demand conformity should be based on the price mechanism, and its realization should be aimed for in earnest.

Also, in view of the fluidity, instability and uncertainty surrounding various oil-related issues, it would be best to adopt policies or schemes offering maximum "elasticity." In this respect, the present intermediate report leaves many items requiring much deeper consideration, and other subjects -- such as the relation between the topics discussed and development and distribution questions - must also be studied.

The study group intends to continue its careful investigation of the various issues discussed thus far, in order to make a contribution to the creation of an oil strategy for the 1980's. Our guiding principle as we proceed will follow the words of the late Ichiro Nakayama:

> **"What should the government do? And what should the government not do? Both of these aspects have a vital role in economic development."**

(End)

CSO: 4120/313

SCIENCE AND TECHNOLOGY

PETROLEUM ALTERNATIVES DEVELOPMENT STEPPED UP

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16, No 30, 27 Jul 81 pp 1-4

/Text/

According to the latest available Ministry of International Trade and Industry forecast dated November 28, 1980, Japan's "alternative energy" supply target for fiscal 1990 is set at 6 million barrels per day in oil equivalent, or 50 percent of total primary energy supply (JPEW Vol.15, No.48, dd. December 1, 1980 - p.3), as quoted below:

	Oil Equivalent		% share of total primary energy
	million kl	1,000 b/d	
Coal	123.0	2,120	17.7
Nuclear	75.9	1,308	10.9
Natural gas (incl. LNG)	71.0	1,225	10.2
Hydraulic power	31.9	550	4.6
Geothermal energy	7.3	126	1.1
Others: Liquefied coal	22.6	389	3.2
Solar energy	6.5	112	0.9
Others	9.4	162	1.4
	38.5	663	5.5
Alternative energy total	ab. 350	ab. 6,000	50.0

The "petroleum alternatives" aimed at by programs outlined below for production by fiscal 1990 are included in the 9.4 million kl (162,000 b/d) in "Others" of the foregoing target.

The word "petroleum alternatives" as used here can be defined as liquid fuels to be produced to supplement conventional oil products such as gasoline and middle distillates, supply and distribution of which will be carried out through the existing oil product marketing and distribution system.

Japan Oil Shale Engineering Co., Ltd.

Japan Oil Shale Engineering Co., Ltd. was established on July 7, 1981, for the purpose of promoting R&D on oil shale resources development.

The new company was established under the Japan National Oil Corporation's five-year plan as launched this fiscal year to undertake promotion of technological research and development for the utilization of oil shale as one of the important petroleum alternative energy sources. The world recoverable reserves of oil shale are estimated at 190 billion barrels versus 660 billion barrels for oil.

The present plan calls for construction and operation of a 300-500 ton-per-day pilot plant during the fiscal 1983-1985 period with an estimated total capital expenditure of ¥14 billion ($61 million), of which ¥1,246 million ($5.4 million) has been appropriated in the JNOC budget for spending in fiscal 1981.

Details of the new company, its executives and participating companies are shown below:

Head office Dai-ichi Toyo Kaiji Bldg.
1-16-3 Nishi-Shimbashi, Minato-ku, Tokyo 105
Telephone: Tokyo (03) 595-0881

Executives President: Toshiharu Uchida, director of Nippon Steel Corp.

Managing director: Yoshio Kawashima, managing director of the Petroleum Producers Association of Japan

36 Participating companies (with the mark * indicating less than 1%)

6 Iron & steel firms	% share of equity capital
Nippon Steel Corp.	10.0
Nippon Kokan K.K.	10.0
Kobe Steel, Ltd.	6.5
Sumitomo Metal Industries, Ltd.	*
Kawasaki Steel Corp.	*
Japan Steel Works, Ltd.	*
11 Oil firms	
Idemitsu Kosan Co., Ltd.	6.5
Nippon Mining Co., Ltd.	6.5
Daikyo Oil Co., Ltd.	4.0
Maruzen Oil Co., Ltd.	4.0
Mitsubishi Oil Co., Ltd.	4.0
Japan Petroleum Exploration Co., Ltd.	*
Kashima Oil Co., Ltd.	*
Kyodo Oil Co., Ltd.	*
Kyushu Oil Co., Ltd.	*
Taiyo Oil Co., Ltd.	*
Teikoku Oil Co., Ltd.	*

6 Heavy industries firms	% share of equity capital
Mitsubishi Heavy Industries, Ltd.	10.0
Mitsui Engineering & Shipbuilding Co., Ltd.	6.5
Ishikawajima-Harima Heavy Industries Co., Ltd.	*
Kawasaki Heavy Industries, Ltd.	*
Hitachi Shipbuilding & Engineering Co., Ltd.	*
Sumitomo Heavy Industries, Ltd.	*
6 Trading firms	
C. Itoh & Co., Ltd.	*
Marubeni Corp.	*
Mitsubishi Corp.	*
Mitsui & Co., Ltd.	*
Nissho-Iwai Co., Ltd.	*
Sumitomo Corp.	*
7 Other firms	
Chiyoda Chemical Engineering & Construction Co.	6.5
Onoda Cement Co., Ltd.	6.5
Mitsubishi Mining & Cement Co., Ltd.	6.5
Fuji Electric Co., Ltd.	*
Japan Oil Engineering Co., Ltd.	*
JGC Corp.	*
Toyo Engineering Co., Ltd.	*

Research Association for Petroleum Alternatives Development (RAPAD)

Twenty-three companies in the field of petroleum, fermentation, chemicals, engineering and others jointly established the Research Association for Petroleum Alternatives Development (RAPAD) on June 5, 1980, in accordance with the Mining & Manufacturing Industries Technology Research Association Law. (Among the other research associations of similar nature are: Research Association for Residual Oil Processing (RAROP) and Research Association of Subsea Oil Production System.)

The formation of the RAPAD is to promote R&D on new liquid fuels for early commercialization through:

- **Production of hydrocarbon oils (such as gasoline and middle distillates equivalent) or oxygen-containing fuel oils (which can be blended into motor gasoline - known as "gasohol") from synthesis gas, i.e. CO and H_2.**

- **Refining and upgrading of tar sand bitumens and shale oils.**

- **Biomass conversion for fuel ethanol fermentation.**

The foregoing three-tier R&D programs are being implemented under the seven-year plan which started in fiscal 1980 with an estimated total capital expenditure of ¥38.8 billion ($170 million), as shown below.

Government funds are provided to finance two-thirds of the total expenditure, with the remaining one-third shouldered by the private sector.

	¥million
(1) Synthetic fuels from synthesis gas:	
. Production of hydrocarbon fuels	12,246.6
. Production of oxygen-containing fuel oils	3,892.9
	16,139.5
(2) Upgrading of tar sand bitumens and shale oils:	
. Tar sand	10,046.9
. Shale oil	3,173.5
	13,220.4
(3) Biomass conversion	
. Ethanol fermentation from cellulose hydrolysis	8,406.5
. Continuous ethanol fermentation using immobilized yeast cells	1,006.6
	9,413.1
Total	38,773.0

Details of RAPAD, its executives and participants are shown below:

Secretariat office
Kojima Bldg.
1-4-2 Uchi Kanda, Chiyoda-ku, Tokyo 101
Telephone: Tokyo (03) 233-3531

Executives
Chairman: Teruo Noguchi, president of Koa Oil Co.
Executive managing director: Goro Oda

23 Participating companies:

9 Petroleum refining firms

Asia Oil Co., Ltd.
Daikyo Oil Co., Ltd.
Idemitsu Kosan Co., Ltd.
Koa Oil Co., Ltd.
Maruzen Oil Co., Ltd.
Mitsubishi Oil Co., Ltd.
Nippon Mining Co., Ltd.
Nippon Oil Co., Ltd.
Showa Oil Co., Ltd.

4 Fermentation firms

Ajinomoto Co., Ltd.
Godo Shusei Co., Ltd.
Kyowa Hakko Kogyo Co., Ltd.
Sanraku-Ocean Co., Ltd.

3 Chemical firms

Chisso Corp.
Kansai Paint Co., Ltd.
Sumitomo Electric Industries, Ltd.

7 Engineering firms

Chiyoda Chemical Engineering & Construction Co., Ltd.
Hitachi, Ltd.
JGC Corp.
Kurita Water industries, Ltd.
Mitsubishi Heavy Industries, Ltd.
Sumitomo Jukikai Envirotech Inc.
Toyo Engineering Corp.

CSO: 4120/314

SCIENCE AND TECHNOLOGY

EARLY INTRODUCTION OF OIL STANDARD PRICES DELAYED

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 33, 17 Aug 81 pp 1-4

/Text/

The establishment of government-set standard selling prices of certain products, originally scheduled to be decided at the forthcoming August 20 meeting of the Petroleum Council (JPEW, August 3), an advisory body to International Trade and Industry Minister Rokusuke Tanaka, now appears to be postponed at least till mid-September, thereby killing industry hopes that the standard prices would be implemented as of September 1 as initially planned.

Under the originally proposed schedule, the September 1 implementation was to be effected to support a rise in petroleum product prices and rescue the petroleum refining and primary distribution industry from its current financial predicament. However, critical reaction from the consumer sector - in particular from the electric power and iron & steel industries - far exceeded expectations and criticism of the oil industry was rampant even within the Petroleum Council itself, which called for greater self-help efforts on the part of the industry in improving its own structure. As a result of this combined pressure, the decision on standard prices was put off for another month until the council reconvenes in mid-September.

With the question of establishing standard prices temporarily shelved, the August 20 meeting is now expected to focus attention on two other issues: (i) downward revision by approximately 10 percent of the Petroleum Supply Plan for fiscal 1981, and (ii) seeking a structural reform of the industry through such measures as elimination of excessive facilities and reorganization of the downstream sector of the Japanese oil industry into a smaller number of companies.

As part of its investigation into measures aimed at saving the oil industry, the Petroleum Council held a subcommittee meeting with members of the industry on August 12 to hear their opinions on the subject. At this meeting, Petroleum Association of Japan chairman Tokio Nagayama expressed his opinion on long-term measures to be taken in the following terms:

(1) Marketing and primary distribution companies, currently numbering 13, are too numerous and should be reduced to a smaller number to eliminate excessive competition among companies.

(2) Approximately 10 percent of the existing refining capacity (5,940,360 barrels per stream day) are superfluous and should be eliminated.

(3) Because the elimination of the superfluous refining capacity falls within the scope of the Antimonopoly Act, MITI's advice should be sought on the issue.

In response to these suggestions, the subcommittee voiced its opinion that the efforts taken by the industry itself to date were sorely insufficient. Furthermore, on the question of regrouping marketing/primary distribution companies, the subcommittee suggested that the current total number of 13 companies should be reduced to half, enabling each company to have a market participation of 10 percent or more, or, if mergers are deemed infeasible, then formation into groups should be taken into consideration.

What is now making the matter complex is the fact that the yen, which has been on the downward trend for some time and has brought a huge amount of foreign exchange loss to the Japanese oil industry, started quite recently to give signs of appreciation as shown below, much to the embarrassment of the oil industry, thereby raising fears among oil companies that they may lose the grounds for introducing standard selling prices should the yen continue to appreciate rapidly.

Last week the dollar plunged and in fact on Thursday (August 13) it hit a one-month low of ¥229.50 - the lowest since July 13 when it fell ¥228.30. A small recovery was seen on Friday, but as stated above it appears to be on the downward trend, at least for the immediate future. Trading was extremely heavy on Tuesday (August 11) with turnover totaling $1,616 million - the third highest after June 16 this year when $1,671 million was recorded.

		T.T.	T.T.	Interbank Rate		
		Selling	Buying	Middle	Low	High
August	3	242.70	240.70	241.70	241.00	243.80
	4	248.40	246.40	247.10	241.50	247.40
	5	245.70	243.70	240.00	239.30	245.60
	6	241.10	239.10	240.50	238.70	241.10
	7	240.00	238.00	239.00	236.00	239.20
	10	237.70	235.70	237.30	235.50	237.70
	11	237.75	235.75	236.80	236.50	237.65
	12	236.80	234.80	234.00	233.30	236.25
	13	231.80	229.80	230.20	229.50	231.70
	14	234.50	232.50	233.80	232.60	234.40

Coinciding with the opening on August 10 of the UN Conference on New and Renewable Sources of Energy in Nairobi, Kenya, a 1,000-KW solar thermal electric power generation pilot plant - the first pilot plant of this magnitude to go onstream in the world - started full-scale operation on August 6 at Nio-cho, Kagawa Pref. in Shikoku, supplying the electricity thus generated to Shikoku Electric Power Co. for consumption by local citizens.

Two pilot plants - of the Central Receiver System and Plane-Parabolic System (each having an output capacity of 1,000 KW) - had been completed in March of this year at an estimated total cost of ¥10 billion ($43 million) and have been in test operation since April. The one which has just started full operation is the Central Receiver System, while the Plane-Parabolic System is scheduled to follow suit on August 18.

The Electric Power Development Co. (EPDC) had been commissioned by the Industrial Science and Technology Agency of the Ministry of International Trade and Industry to conduct the R&D and construction of the two pilot plants through the end of fiscal 1980 (March 31, 1981), while since April 1981 EPDC has been commissioned by the New Energy Development Organization (NEDO) to carry out operation of these plants for a period of about two years to collect the operating data. Meanwhile, two domestic manufacturers of the plant and equipment - Mitsubishi Heavy Industries for the Central Receiver System and Hitachi, Ltd. for the Plane-Parabolic System - have been commissioned by NEDO to check the performance and durability of each equipment.

The pilot plant of the Central Receiver System consists of a total of 807 geometric linkage type heliostats, each composed of 16 plane mirrors 1 m x 1 m (3.28 ft x 3.28 ft), 5 mm thick and made of white sheet glass, which are controlled by means of a microcomputer for automatic tracking of the sun. The solar light received by these reflection mirrors is concentrated at the heat receiver installed at the top of a 69-meter (226 ft) tall tower. In the Plane-Parabolic System, the sunlight falling on a total of 2,480 plane mirrors (4.5 m^2, 48 ft^2 each) is reflected and concentrated on cylindrical parabolic mirrors, from which it is further concentrated at the focal line of the parabolic mirror to heat the water to obtain superheated steam.

The solar thermal power generation pilot plant study project at Nio-cho constitutes part of the "Sunshine Project," an ambitious national technological development program launched in 1974 by the Industrial Science and Technology Agency, envisaging utilization of inexhaustible, pollution-free solar and geothermal energy, coal gasification/liquefaction, and hydrogen energy, by the year 2000. The other solar energy development program under the Sunshine Project includes R&D on photovoltaic power generation system and solar heating/cooling and hot water supply system. A total national budget of ¥7,961 million ($35 million) has been appropriated for expenditure in fiscal 1981 for the entire solar energy development program (JPEW, January 19, 1981 - pp. 7 and 8).

With a veiw to consolidating Japan's economic security and at the same time safeguarding the economic interests of the entire non-communist world, the Japanese government has decided to give all-out support to a project to construct a 1,500-km (930-mile) crude oil pipeline running through the Arabian Peninsula from north to south, with an estimated total expenditure of $4,000 million - a plan which has been advocated by the Omani government since the outbreak of war between Iran and Iraq in September 1980. This decision by the japanese government was made because Saudi Arabia, which holds the key to realization of the project and aims at uninterrupted flow of its oil to the West, has informally sounded out Japan on the possibility of winning its cooperation in the pipeline project.

Earlier this year, Omani Vice Foreign Minister Jousuf Al-Alawi, who visited Japan to request Japanese cooperation in constructing a new oil pipeline in his talks with the Foreign and International Trade and Industry Ministers.

Plans are now under way for the Japanese government to shortly set up a new machinery, tentatively called Gulf Pipeline Development Council, with joint participation by private industries including three leading trading firms - Mitsubishi Corp., Mitsui & Co. and Marubeni Corp. - and two leading iron and steel companies - Nippon Steel Corp. and Nippon Kokan K.K. - for the purpose of promoting this project on a national project basis. The council is expected to work out a detailed cooperation plan by the time the Saudi Crown Prince visits Japan this fall.

At present, the entire quantity of over 15 million barrels daily exported to Japan, the U.S. and Europe from Saudi Arabia, Kuwait, Bahrain, Qatar and the United Arab Emirates must pass through the narrow Hormuz Strait to reach the open sea. Such vulnerability is of great international concern, especially to Japan which imports 70 percent of its total oil via this strait, hence the setting up of an alternative oil supply route is a matter of keen interest not only to the government, but to trading and industrial circles as well.

Outlined below are the salient points of the Saudi proposal concerning the pipeline construction project:

- The pipeline will link the Ras Tanura oilfield in Saudi Arabia to an export terminal either at Masirah Island or Muscat in Oman.

- Japan is to undertake the laying down of the pipeline and its operation.

- In principle, Saudi Arabia will charge no transit fee for the passage of crude oil through its territory.

- The ownership of the pipeline itself will rest with Saudi Arabia.

CSO: 4120/311

MEASURES TO REHABILITATE COAL MINING INDUSTRY URGED

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 32, 10 Aug 81 pp 1-6

/Text/

The Coal Mining Council advised the government to take measures to maintain Japan's domestic coal production at 20 million tons a year through the industry's self-help efforts for modernization, governmental support and cooperation from coal consumer industries. An advisory body to the International Trade and Industry Minister, the council (chaired by Yoshihiro Inayama, president of the Japan Federation of Economic Organizations) submitted its package of recommendations - the seventh of its kind - to Minister Rokusuke Tanaka on August 4. Based on the latest recommendation, MITI is expected to work out a new five-year plan for rehabilitation of the domestic coal mining industry, starting next fiscal year beginning April 1982.

Six years have elapsed since the council presented its sixth recommendations in July 1975, envisaging the domestic coal output at more than 20 million tons a year. Among the changes in the environment of the domestic coal mining industry, which made it necessary to update the previous recommendations, are:

- The appreciation in the yen exchange rate to the US dollar (from ¥299=$1 in fiscal 1975 to ¥219=$1 in fiscal 1980) contributed to widen the price gap between the locally produced coal and the imported coal in favor of the latter. Nevertheless, the sharply increased oil and overseas coal prices greatly improved the competitiveness of the domestic coal mining industry.

- The second oil crisis triggered by the Islamic Revolution in Iran accelerated the resurgence of coal in subsequent years as an important energy source alternative to oil from the standpoint of energy supply security.

- The current Law Concerning Special Measures for Rationalization of the Coal Mining Industry (Law No. 156 of 1955) is due to expire March 31, 1982.

Despite the government financial aid, the domestic coal mining industry still is incurring considerable recurring losses, as seen from the financial results of five largest coal mining companies shown below:

(A) = Sales realization (at coal mine)
(B) = Cost of product sold
(C) = Administration
(D) = Interest
(E) = Other non-operating expenses
(F) = Recurring losses (= A-B-C-D-E)
(G) = Government aid
(H) = Recurring losses after government aid

(Unit:¥/kiloliter)

Fiscal Year	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
1975	10,235	11,117	419	500	220	-2,021	1,055	-966
1976	11,820	12,189	381	505	231	-1,486	1,197	-289
1977	13,131	13,198	399	579	284	-1,329	1,196	-133
1978	13,200	13,567	342	744	301	-1,754	1,270	-484
1979	13,060	13,769	299	881	102	-1,991	1,373	-618
1980	14,724	14,711	279	927	375	-1,568	1,401	-167

(Source: MITI)

The recommendations package includes, among others:

- Extension for five years of the current Law Concerning Special Measures for Rationalization of the Coal Mining Industry, with governmental financial aid provided from the Coal, Petroleum and Alternative Energy Special Account.

- Absorption of production cost increases arising from ever increasing depth and distance of coal-mine pits through the industry's efforts toward modernization, as well as through joint operation with neighboring collieries.

- Encouraging development of new coal mines and re-development of closed mines to cope with the growing demand for coal, with the government implementing necessary measures to support such projects.

- Maintaining the current system of setting area-to-area standard prices for domestic coal each year, but taking into account the prevailing production costs and spot imported coal prices (rather than fuel oil prices).

- Strengthened government subsidy in a selective manner to lessen the colliery-to-colliery gap in financial structures, until the measures for rehabilitation of the coal mining industry bear fruit.

- Stepped-up cooperation with countries having coal reserves for development of those resources, with infrastructure facilities streamlined to cope with the production increase.

- Promotion of R&D on expanded utilization of coal energy.

Supplementary Data

(1) Domestic Coal Production

While the council's sixth recommendations in 1975 called for maintenance of Japan's domestic coal output at more than 20 million tons a year, the actual annual production during the fiscal 1976-1980 period averaged 18.3 million tons, as shown below:

Fiscal Year	No. of collieries in operation at the yearend	Production* (1,000 tons)	Productivity (tons/man/month)
1960	622	52,607 (41,380)	18.0
1961	574	55,413 (43,625)	21.7
1962	418	53,587 (42,270)	24.9
1963	306	51,099 (39,279)	31.3
1964	263	50,774 (38,191)	36.4
1965	222	50,113 (37,506)	38.1
1966	198	50,554 (35,658)	40.3
1967	158	47,057 (32,629)	42.7
1968	142	46,282 (32,150)	47.9
1969	96	43,580 (29,770)	55.8
1970	74	38,329 (24,568)	61.0
1971	70	31,728 (17,742)	63.4
1972	55	26,979 (13,382)	66.0
1973	37	20,933 (9,817)	68.2
1974	36	20,292 (9,816)	71.8
1975	35	18,597 (9,262)	67.8
1976	30	18,325 (9,769)	69.5
1977	29	18,571 (9,602)	73.3
1978	26	18,550 (9,889)	74.6
1979	26	17,760 (10,093)	76.8
1980	25	18,095 (11,404)	81.8

(*) Figures shown in brackets indicate coking coal which are also included in figures outside.

(2) Supply & Demand of Domestic Coal

(Unit:1,000 tons)

Supply	Fiscal 1975	Fiscal 1976	Fiscal 1977	Fiscal 1978	Fiscal 1979	Fiscal 1980
Opening inventory	1,090	740	550	1,790	3,460	3,450
Production	20,290	18,600	18,330	18,570	18,550	17,760
Total	21,380	19,340	18,880	20,360	22,010	21,210
Demand						
Coking coal:						
Iron & steel	7,340	6,940	6,650	6,450	6,460	6,420
City gas	700	540	470	430	450	440
Coke	1,050	810	740	930	930	820
Others	170	160	60	70	50	90
	9,260	8,450	7,920	7,880	7,890	7,770

(Unit:1,000 tons)

Demand (cont'd)	Fiscal 1975	Fiscal 1976	Fiscal 1977	Fiscal 1978	Fiscal 1979	Fiscal 1980
Steam coal:						
9 electric utilities	4,290	4,310	4,520	4,130	4,290	5,070
Elec. Power Devel. Co.	2,640	3,010	3,040	2,990	3,140	3,420
Other elec. utilities	1,400	1,360	1,200	1,230	1,400	1,340
Others	2,280	2,230	1,790	1,410	2,170	3,640
	10,610	10,910	10,550	9,760	11,000	13,470
Closing inventory	740	550	1,790	3,460	3,450	1,880
Unaccounted for	770	-570	-1,380	-740	-330	-1,910
Total	21,380	19,340	18,880	20,360	22,010	21,210

(Source: MITI)

(3) MITI-Set Standard Prices of Domestic Steam Coal for Fiscal 1980

In accordance with the provision in Article 58 - Item 1 of the Law Concerning Special Measures for Rationalization of the Coal Mining Industry (Law No.156 of 1955), MITI minister establishes each year standard prices of domestic coal on an area-by-area basis. The standard prices for fiscal 1980 were published on October 15, 1980, as quoted below:

Steam coal for electric utilities

Area	Grade (kcal/kg,wet)	Standard Prices for Fiscal 1980*,¥/ton	
		April 1980	May 1980 through March 1981
Hokkaido	5,000	12,085	12,245
	6,000	15,300	15,705
Tohoku	6,000	16,900	17,370
Kanto	6,000	17,380	17,850
Chubu	6,000	17,440	17,910
Kansai	6,000	16,400	16,670
Chugoku	6,000	16,250	16,520
Shikoku	6,000	16,255	16,525
Kyushu	5,000	12,265	12,385
	6,000	15,860	15,950

(*) Because the Japan National Railway raised freight charges effective May 1, 1980, the standard prices for fiscal 1980 were set separately before and after the freight rate change.

Steam coal for other uses

Hokkaido	6,000	15,500	15,660
Tohoku	6,000	16,900	17,370
Kanto	6,000	17,380	17,850
Chubu	6,000	17,440	17,910
Kansai	6,000	16,400	16,670
Chugoku	6,000	16,250	16,520
Shikoku	6,000	16,255	16,525
Kyushu	6,000	15,330	15,460

(Source:MITI)

(4) Comparison of Prices - Domestic Steam Coal vs Imported Steam Coal

(Unit:¥/ton)

Fiscal Year	Domestic*	Imported	Difference	¥-$ Rate
1975	11,380	10,700 ($35.78/ton)	680	299.07
1976	13,560	9,840 (33.66)	3,720	292.35
1977	15,440	8,980 (35.01)	6,460	256.53
1978	15,850	7,620 (37.83)	8,230	201.43
1979	16,440	9,720 (42.54)	6,720	228.50
1980	17,850	12,100 (55.33)	5,750	218.67
July	17,850	11,030 (50.61)	6,820	217.95
August	17,850	12,740 (56.66)	5,110	224.85
September	17,850	12,840 (58.60)	5,010	219.10
October	17,850	11,930 (56.76)	5,920	210.18
November	17,850	11,780 (55.76)	6,070	211.28
December	17,850	12,380 (58.16)	5,420	212.85
1981 January	17,850	12,130 (59.46)	5,720	203.99
February	17,850	11,330 (55.69)	6,520	203.44
March	17,850	12,450 (59.91)	5,400	207.80
April	17,850	13,140 (61.98)	4,710	211.99
May	17,850	14,510 (66.81)	3,340	217.18
June	17,850	15,020 (67.09)	2,830	223.89

(*) MITI-set standard price applicable to domestic coal (@6,000 kcal/kg) delivered to ports in the Tokyo/Yokohama area. MITI announced the fiscal 1980 standard prices (retroactive to April 1, 1980) in October 1980. Meanwhile, the fiscal 1981 prices (beginning April 1981) have not been set yet and therefore, the fiscal 1980 prices are assumed to apply to months in fiscal 1981, as shown above.

(5) Economic Advantage of Steam Coal vs Fuel Oil C

(Based on a model power plant located at Takasago, Hyogo Pref.)

	Fiscal 1975		June 1981	
Coal price*:	Domestic	Imported	Domestic	Imported
¥/ton	10,740	12,030	16,640	16,960
¥/1,000 kcal (a)	1.92	2.16	2.98	3.04
Additional cost associated with coal**:				
¥/ton	.... 2,750		.... 2,850	
¥/1,000 kcal (b)	.... 0.49		.... 0.51	
Fuel oil C price***:				
¥/kl	.... 21,700		.... 51,350	
¥/1,000 kcal (c)	.... 2.21		.... 5.24	
Coal vs Fuel oil C (a+b-c):				
¥/1,000 kcal	0.20	0.44	-1.75	-1.69
¥/ton coal	1,116	2,455	-9,765	-9,430

(*) MITI-set standard price of domestic coal (@6,000 kcal/kg; 5,580 kcal/kg after removing moisture), delivered to Takasago.

(**) Expenses related to storage of coal, ash disposal, etc.

(***) Sulfur content 3.0% and 9,800 kcal/liter.

(Source:MITI)

(6) Coal's Position in Japan's Long-Range Energy Supply (dated August 31, 1979)

	Fiscal 1985	Fiscal 1990	Fiscal 1995
Domestic coal, million tons			
Steam coal	10.0	10.0	10.0
Coking coal	10.0	10.0	10.0
	20.0	20.0	20.0
Imported coal, million tons			
Steam coal	22.0	53.5	80.5
Coking coal	79.0	90.0	97.5
	101.0	143.5	178.0
Total	121.0	163.5	198.0
% Share of Japan's total primary energy supply:			
Domestic steam coal	1.2%	0.95%	0.85%
Domestic coking coal	1.3	1.05	0.95
	2.5	2.00	1.80
Imported steam coal	2.5%	5.0%	6.6%
Imported coking coal	11.1	10.6	9.9
	13.6	15.6	16.5
Total	16.1%	17.6%	18.3%

CSO: 4120/316

PRATT, GE SEEK PARTICIPATION IN RJ500

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 p 3

[Text]

Pratt & Whitney (P&W) and General Electric (GE) of the United States have sounded out Japanese industry for their participation in the RJ500 engine development program now being promoted jointly by Rolls-Royce Limited of the United Kingdom and three Japanese heavy industrial firms, IHI, KHI and MHI, Japanese industry sources said last week.

Taiji Ubukata, President of IHI, informed British Secretary of State for Industry Sir Keith Joseph about the approaches by the two American manufacturers during his recent UK visit, the sources report. Representatives of the three Japanese companies have also been in touch with top executives of Rolls-Royce about the matter, they say.

The Japanese industry is reportedly welcoming such a move by P&W and GE on the grounds that this will help reduce the financial burden of each participating company. Participation by an American manufacturer(s) will also help speed up the development time table, Japanese industry leaders point out.

Since the beginning of July, top executives of P&W and GE have been in Japan one after another to sound out the possibilities of their participation in the RJ500 engine program. They are expected to make official proposals to Rolls-Royce and the three Japanese partner companies very soon on their plans to participate in the program.

The Ministry of International Trade and Industry (MITI) basically welcomes participation of other world leading engine manufacturers in the program on the condition that this meets full approval of the British partner, Rolls-Royce.

The board of directors of Rolls-Royce and Japanese Aero Engines Limited, the joint venture between Rolls-Royce and the three Japanese manufacturers, met in London toward the end of July and decided to power up the RJ500 engine so that it will be suitable for 150-seater aircraft. The first prototype engine, designated RJ500-01, is planned to begin test running at the end of January 1982 at Bristol facility of the British company.

CSO: 4120/317

ADVISORY BODY FAVORS PRIVATE TAKEOVER OF NAMCO

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 p 4

[Text] An opinion supporting the private sector's proposed takeover in FY 1982 of the semi-governmental Nihon Aeroplane Manufacturing Co.'s (NAMCO) current business prevailed at the 14th meeting late in July of the Policy Subcommittee of the Aircraft & Machinery Industry Council's Aircraft Industry Committee, an advisory body to the Ministry of International Trade and Industry (MITI). NAMCO is now engaged in supply of spare parts for in-service YS-11 turboprop airliners.

While supporting the takeover, some members of the subcommittee said appropriate measures should be taken to secure the continued manufacture of YS-11 parts, technical assistance to YS-11 users, production control for subcontractors and smooth parts supply for safe operation of the aircraft. They also said full consideration should be given to current NAMCO employees.

The subcommittee eventually decided to discuss these problems with government agencies concerned and the industry sector before compiling recommendations on the takeover in the middle of August.

The meeting also dealt with Japan's Boeing 767 production setup and development of the Y-XX medium-size transport. Most of the participants proposed that Civil Transport Development Corp. (CTDC), a non-profit corporation representing Japanese interests in the B-767 program, transfer the program to a new company after mass production of B-767s starts in FY 1983. As to the Y-XX program, the subcommittee members agreed that CTDC should undertake the program in the immediate future. But some members said if foreign partners for the Y-XX program are selected, the Japanese undertaker should be reconsidered. They apparently fear that CTDC, involved in the B-767 program, would not be appropriate for the Y-XX program in case foreign aircraft manufacturers other than Boeing are selected as partners.

On jet engine development programs, such as the Rolls-Royce/Japan RJ500 project, the subcommittee members shared the view that organizations other than aircraft development corporations should take charge of engine programs.

CSO: 4120/317

Y-XX PROGRAM REPORTED AT STANDSTILL

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 4-5

[Text]

Work on a preliminary design of the Y-XX new medium-size transport has been at a standstill as NAMCO's labor union, whose 30 members are being transferred to CTDC to undertake the Y-XX program, remains opposed to the program. Although CTDC intends to start the Y-XX program with the preliminary design work in the current fiscal year, NAMCO's labor union has insisted that the advisability of the design work is doubtful at a time when the program has yet to take a definite shape.

The union is also opposed to MITI's plan to dissolve the semi-governmental NAMCO in FY 1982 in administrative reform efforts.

CTDC submitted to the union a proposal last May for establishment of a Y-XX program preparation office consisting mainly of engineers from three major aircraft manufacturers, including Mitsubishi Heavy Industries Ltd., to launch the preliminary design work. But this proposal has yet to be accepted by the union which has demanded that NAMCO undertake the Y-XX program. The union has also asked CTDC to use as many NAMCO employees as possible for the program, complaining about CTDC's plan to get employees mainly of other aircraft manufacturers engaged in the program.

Although CTDC set up the office at the end of June, its activities have yet to start because of the NAMCO union's opposition.

CSO: 4120/317

SONY TO PROMOTE AEROSPATIALE HELICOPTER SUPPORT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 5-6

[Text]

Sony Corp., which was named sales agent of Aerospatiale's Helicopter Division half a year ago, intends to set up one or two service centers for users of Aerospatiale helicopters in the eastern and northeastern parts of Japan in order to step up its service for the French firm's helicopters. These will be in addition to ANA Aircraft Maintenance Co., the Aerospatiale-centificated service center for the western part of the nation.

It also plans to stockpile spare parts for the AS355 Ecureuil, SA365N Dauphin 2 and other third-generation helicopters of Aerospatiale, to employ service engineers trained at the French company for regular maintenance service for users, and to station representatives in France for smooth communications with Aerospatiale.

Sony has already landed Japanese orders for about 10 Aerospatiale helicopters, of which the first one (an AS350B) will arrive in Tokyo in September for assembly by ANA Aircraft Maintenance before delivery to Nagano Broadcasting Co. at the end of November. Others will be delivered by the summer of 1982.

It has scheduled the first demonstration flight in Japan of the new AS355F twin-turbine helicopter for the spring of 1982. It will take delivery of the helicopter in France in December for local pilot training prior.

CSO: 4120/317

SCIENCE AND TECHNOLOGY

JDA, MITI DIFFER OVER MT-X CONTRACTOR SELECTION

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 6-7

[Text]

The Japanese Defense Agency (JDA) and MITI are somewhat different over selection of a prime contractor for the development of the MT-X new intermediate trainer, according to informed sources.

The JDA started consultation with MITI late in July on the selection after in-house evaluation of proposals by the three prime contractor candidates -- Mitsubishi Heavy Industries Ltd. (MHI), Fuji Heavy Industries Ltd. (FHI) and Kawasaki Heavy Industries Ltd. (KHI). The sources said the JDA gives priority to technical aspects of the proposals, while MITI attaches importance to balanced development of the Japanese aircraft industry.

Thus, even tentative selection is expected to be delayed until the end of August. There is also some possibility that the three companies would undertake the MT-X program jointly.

The JDA made the request for proposal (RFP) to the three firms last April 15, and received proposals at the end of May. Early in June, it held consultations separately with the three companies to evaluate these proposals.

In the RFP, the JDA explained that the MT-X's climb rate over the sea is planned at 3,000 meters per minute to fill the gap between 550 meters for the T-3 primary trainer and more than 10,000 meters for the F-15 fighter. The MT-X, similar to the F-86 in shape, is designed to undertake a wide-range of training flights from acrobatic flights to stalling.

Among the three companies responding to the RFP, MHI seems superior to the other two in the technological field because of its development and production of the T-2 supersonic trainer. KHI's technology for acrobatic flight performance of small aircraft is said to be somewhat inferior. Although KHI has experienced license production of the T-33 trainer, its aircraft production now centers on larger aircraft such as the P-3C antisubmarine patrol plane. FHI, though strong in technology for small aircraft, has yet to catch up with MHI technologically. Thus, MHI is the most promising candidate as far as the technological aspects are considered primarily.

CSO: 4120/317

NATION READY TO TRANSFER DEFENSE TECHNOLOGY TO U.S.

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 7-8

[Text]

The JDA is expected to express Japan's readiness to meet the United States' request for advanced Japanese military technologies as much as possible at the third defense technology and equipment conference with the U.S. Defense Department in Washington in September.

The U.S. request was made at talks in Washington in late June between Japanese defense chief Joji Omura and U.S. Defense Secretary Caspar Weinberger. Omura promised Weinberger to consider the request.

The forthcoming conference between senior officials of the JDA and the Pentagon is designed to deal with specific technology items which the United States wants from Japan. After the conference, the Japanese government intends to lead the industry sector to transfer its defense technologies to the United States.

The U.S. request has attracted keen attention from major Japanese trading houses, which intend to handle Japan's defense technology exports to the United States if possible. They have already started preparation for the exports, expecting the Americans to specify Japanese technologies for their introduction at the forthcoming conference.

The trading houses are interested in the technology exports at a time when their part in Japan's defense equipment imports has declined due to increased domestic production of weapons systems. MITI has been promoting domestic arms production in consideration of recent technical development of Japanese arms manufacturers. For example, Toshiba Corp. has obtained a prime contract for the Tan-SAM short-range surface-to-air missile, eclipsing European manufacturers. As to the new BADGE air defense system, the JDA has decided to have domestic manufacturers undertake its development and production, although the existing system was introduced from

Hughes Aircraft for license production. Five Japanese electronics manufacturers are now competing for a prime contract for the new BADGE.

The U.S. request also meets the trading houses' new policy of stepping up trade in electronics products, as the Americans have expressed hope to introduce especially advanced electronics technologies from Japan. They expect that Japanese technologies wanted by the Americans would involve laser weapons and radar systems. The Americans are reportedly interested in laser weapons systems now under study at the JDA. As to radars, trading house sources speculate that possible weapons systems for Japan-U.S. joint development in the future may be precision-guided missiles (PGM) using Japan's advanced radar technology. The trading firms expect that their trade in military electronics products could lead to expansion of their consumer electronics business.

CSO: 4120/317

ASDF TO CONSIDER NEW SUPPORT FIGHTER FOR FY 1983-1987 MTDP

Tokyo JPE AVIATION REPORT-WEEKLY in English No 533, 5 Aug 81 pp 9-10

[Text]

The Air Self-Defense Force (ASDF) plans to consider development of a new support fighter, dubbed FS-X, for the FY 1983-87 Medium-Term Defense Program (MTDP) to be prepared by the end of the current fiscal year.

It wants to develop the FS-X as a replacement of the F-1 support fighter after completing aquisition of 100 support fighters in the late 1980s as stipulated in the National Defense Program Outline. At the end of the FY 1980-84 MTDP, the ASDF's F-1 funding is estimated to total 66 aircraft. The remainder will be filled with F-4EJ fighter-interceptors converted into support fighters as its inventory of F-15J fighter-interceptors increases. Thus, the FS-X is expected to replace the F-1 from the early 1990s. Although foreign aircraft could be considered as candidates for the FS-X, the ASDF is certain to adopt domestic development starting in the latter half of the FY 1983-87 MTDP.

The ASDF intends to use the result of on-going research by the JDA's Technical R&D Institute (TR&DI) into the control-configured vehicle (CCV), a high-performance aircraft, for development of the FS-X. A preliminary proposal for the FS-X development has been submitted to the ASDF by Mitsubishi Heavy Industries Ltd. which has developed the F-1 and is manufacturing an experimental CCV for the TR&DI.

The ASDF, interested in the preliminary proposal, hopes that a concrete FS-X development project would be incorporated into the new FY 1983-87 MTDP to secure continuous modernization of its support fighter fleet.

CSO: 4120/317

TOP EXECUTIVES OF MDC, FOKKER IN TOKYO

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 p 4

[Text]

Sanford N. McDonnell, Board Chairman of McDonnell Douglas Corp., and Frans Swarttouw, Chairman of Fokker Aircraft Co., were due to arrive in Tokyo early this week for talks with leaders of the three major Japanese aircraft manufacturers, MHI, KHI and FHI, as well as senior officials of the Ministry of International Trade and Industry (MITI).

McDonnell and Swarttouw are expected to present details of the MDF-100 program to the industry leaders here, sounding out the possibility of Japanese participation in it.

Just prior to their arrival in Japan, top officials of the Japanese aircraft industry, including Eiichi Ohara (Chairman of FHI and President of Civil Transport Development Corporation which represents the Japanese interest in the Boeing 767 development program) were in Seattle, Washington, to attend the roll-out ceremony of the first 767 aircraft. They were presumed to have talked to Boeing leaders on its new aircraft programs during their stay in Seattle.

The Japanese are searching for an international partner(s) for the development and production of a new medium-size aircraft coded here as the Y-XX. Boeing, McDonnell Douglas/Fokker and Airbus Industrie are listed as partner candidates. Although the situation is very fluid, a decision is presently expected toward the end of this year.

CSO: 4120/315

SJAC ASSIGNS 12 FIRMS TO 15 RESEARCH, DEVELOPMENT PROJECTS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 pp 4-6

[Text]

The Advanced Aircraft Technology Development Center of the Society of Japanese Aerospace Companies (SJAC) has comissioned 12 member companies to undertake 15 research-and-development projects in FY 1981 (April 1981-March 1982).

The 15 projects comprise six for airframe structures, four for propulsion systems and five for pilot systems. They include five new projects for environmental characteristics of materials reinforced by carbon and Kevlar fiber, load controls for fuel-efficient transonic aircraft, aerodynamic shapes of fuel-efficient transonic planes, microprocessor-using combustion control systems, and optical aircraft attitude sensors.

The 15 projects and the 12 companies follow:

Airframe Structures

(1) Helicopter blades made of composite materials: Kawasaki Heavy Industries Ltd. (KHI)

(2) Processes for machining lightweight integrated structures: Mitsubishi Heavy Industries Ltd. (MHI).

(3) Highly rigid aluminum alloy: Kobe Steel Ltd., Sumitomo Metal Industries Ltd., and Furukawa Aluminum Co.

(4) Environmental characteristics of present airframe materials reinforced by carbon and Kevlar fiber: Shin Meiwa Industry Co. (Technical data for using these composite materials for airframe structures will be collected through research into environmental effects on strength and rigidness of the reinforced materials)

(5) Load control for fuel-efficient transonic aircraft: KHI. (Load and rigidness controls for high aspect-ratio transonic wings will be studied to determine the direction of future technology for transonic aircraft)

(6) Aerodynamic shapes of fuel-efficient transonic aircraft: KHI. (Engineering data will be collected to improve transonic aircraft wings for stepped-up fuel efficiency)

Propulsion Systems

(7) High-temperature and high-load turbines: Ishikawajima-Harima Heavy Industries Co. (IHI).

(8) Engine combusters producing less nitrogen oxide: KHI

(9) Variable pitch structures for high-speed propellers: Sumitomo Precision Products Co.

(10) Combustion control systems using microprocessors: IHI. (Technical data will be collected to develop highly-reliable digital electronic fuel control systems using microprocessors with environment-resisting silicon on sapphire being applied)

Pilot Systems

(11) New automatic pilot systems: Japan Aviation Electronic Industry Co.

(12) Data processing systems using optical fiber: Fujitsu Ltd.

(13) New aircraft navigation systems: Nippon Electric Co. (NEC).

(14) New cockpit display systems: Shimadzu Corp.

(15) Optical attitude sensors for aircraft: NEC. (Technical data will be collected to apply optical fiber gyros to optical aircraft attitude sensors)

CSO: 4120/315

SUMITOMO TO EXPORT 767 LANDING GEAR PARTS TO CPC

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 p 6

[Text]

Sumitomo Precision Products Co. has signed a $400,000 contract to export 216 landing-gear brake rods for 27 Boeing 767s to Cleveland Pneumatic Co. (CPC) in January-June 1983.

The contract was clinched late in July to mark the 25th anniversary of Sumitomo's technical tie-up with CPC. It represents Sumitomo's first export to CPC. So far, Sumitomo has introduced technologies from the American landing gear manufacturer for domestic use only.

CPC has appreciated Sumitomo-developed complex technology for machining brake rods made of special steel. Its product has passed Boeing Co.'s examination regarding the landing gear. Sumitomo expects to receive additional orders for B-767 landing gear brake rods from CPC.

Sumitomo tied up with CPC in June 1956 to introduce CPC's knowhow for F-86 landing gear.

CSO: 4120/315

NAL TESTS AILERON FOR STOL AIRCRAFT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 pp 7-8

[Text]

The National Aerospace Laboratory (NAL) of the Science & Technology Agency has conducted basic tests on the boundary layer control of the aileron to be attached to the main wing of its experimental short takeoff and landing (STOL) aircraft now under development, and found there are no problems with the drilled-hole nozzle which has never been used for aircraft anywhere in the world.

The successful tests have led the NAL to adopt the new nozzle for the STOL aircraft. The drilled-hole nozzles are a line of two-millimeter-diameter holes in front of the aileron to blow off high-pressure air in order to prevent laminar separation on the upper surface of the aileron.

Originally, the NAL design called for air to be blown off from the engine's compressor at 8.5 atomospheres of air pressure through one-millimeter-diameter holes. Later, however, it found that much air pressure would be lost before blowing off. Then, it reduced the air pressure to 3.24 atmospheres and increased the hole's diamter to two millimeters in order to secure sufficient air. The latest tests at a low-speed wind tunnel of Kawasaki Heavy Industries Ltd.'s Gifu Works were aimed at confirming the revised nozzle's satisfactory performance.

The aileron is a key part of the high-lift device which enables the aircraft's short takeoff and landing. Usually, it is inclined by 40 degrees for takeoff and landing. In case the engines are in trouble, however, it would have to be inclined by as much as 60 degrees at the risk of causing it to stall. In order to avoid the stall, the laminar flow on the upper surface of the aileron must be maintained.

On the NAL-designed STOL aircraft, high-pressure air is blown off on the upper surface of the aileron through drilled holes at the main wing's hollow 15 centimeters away from its rear edge to prevent laminar separation. On European and U.S. STOL aircraft, however, a one-millimeter-wide slit is used as the nozzle for blowing off low-pressure air. The NAL is confident that the drilled hole is easier to make.

Although doubts had been cast over whether high-pressure air through the drilled holes can spread over the aileron evenly, the tests cleared such doubts and indicated no performance problems.

The NAL intends to complete the experimental STOL aircraft by 1983 for flight tests.

CSO: 4120/315

JDA TO SELECT MT-X PRIME CONTRACTOR IN SEPTEMBER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 pp 9-10

[Text]

The JDA will select a prime contractor for the development of the MT-X intermediate trainer for the Air Self-Defense Force (ASDF) in September, though some quarters had expected it to name the prime contractor by early July to seek that manufacturer's cooperation in preparing the budget request for FY 1982.

It now intends to incorporate an average of the cost estimates proposed by the three contenders for the MT-X prime contract into the FY 1982 budget request, which will be submitted to the Ministry of Finance late in August. Originally, the JDA planned to select the prime contractor earlier to work out a definite estimate which can stand firm against severe downward pressure on research and development expenses resulting from its policy of giving top priority to procurement of main defense equipment for the immediate future.

Upon selection of the prime contractor from MHI, KHI and FHI, the JDA will organize an MT-X engineering team to start work on a preliminary MT-X design which has been funded under the FY 1981 budget.

Meanwhile, IHI is trying to reduce costs for the XF-3 small turbofan engine which it has designed for the MT-X because the JDA has decided to hold the MT-X engine price down to not more than ¥150 million per unit with the trainer's total price planned at less than ¥1,300 million.

The XF-3 engine has already met the JDA's performance requirements for the MT-X involving the thrust power and weight. But it seems to be difficult for IHI to meet the cost requirements for the MT-X at a time when prices of imported engine materials such as titanium are rising due to the yen's sharp depreciation against the U.S. dollar.

The Snecma Larzac and the Garrett AiResearch TFE1042 are competing with the XF-3 as candidates for the MT-X engine. Selection of the MT-X engine is expected to come in October 1982 at the earliest.

In view of the two foreign candidates, IHI is now reviewing the whole design of the XF-3 in a bid to reduce its production cost as much as possible.

As MT-X procurement is estimated to total 200 aircraft, engine production for the aircraft could reach more than 600 units, which is beyond the generally accepted break-even line for aircraft engines of 500 units.

CSO: 4120/315

DURABILITY OF H-1 ROCKET'S COMBUSTION CHAMBER PROVEN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 534, 12 Aug 81 p 10

[Text]

The National Space Development Agency (NASDA) has tested a prototype combustion chamber of the LE-5 second-stage engine for the H-1 rocket now under development and confirmed its satisfactory durability.

In the tests at Mitsubishi Heavy Industries Ltd.'s Tashiro testing facility in Akita Prefecture in late July, the combustion chamber was run for 360 seconds to simulate the actual operation of the LE-5 on the rocket. The 360-second run, done three times, proved the chamber has no problems regarding durability, paving the way for tests of the chamber linked with the propellant tank starting in November.

Before the tests, NASDA ran another prototype combustion chamber for 60 seconds with propellant supplied from a separate high-pressure run tank to confirm its normal operation. This prototype will be linked with the propellant tank for the tests late this year, which will be preceded by tests of a full engine system containing the combustion chamber, the liquid hydrogen (propellant) turbo pump and the liquid exygen (oxidizer) turbo pump in August.

The tests starting in November, the final stage for the development of the LE-5, are designed to find problems with the linkage between the full engine system and the propellant tank and confirm performance of the overall second-stage propulsion system.

NASDA plans to use the H-1 rocket for launching large satellites for broadcasting, air traffic control and other purposes. Its thrust is designed at about 500 kilograms.

CSO: 4120/315

ASDF ASKS THREE FIRMS FOR BADGE-X PROPOSAL

Tokyo JPE AVIATION REPORT-WEEKLY in English No 535, 19 Aug 81 p 6

[Text]

The Air Self-Defense Force (ASDF) has requested Fujitsu, Hitachi and Nippon Electric Co. (NEC) for proposals on the development and production of the BADGE-X new air defense environment system which it plans to begin construction in FY 1983. NEC will tie up with Mitsubishi Electric Corp. (MELCO), Toshiba and Oki Electric. The proposals will be submitted to the air force authorities by the end of January 1982.

Hughes Aircraft Co., which has designed and produced the present BADGE system in cooperation with NEC, will give technological assistance to the NEC group.

The ASDF is scheduled to make a decision in summer 1982 so that initial appropriations will be included in the FY 1983 defense budget request which will be submitted to the Ministry of Finance by the end of August 1982. The BADGE-X system is scheduled to be placed in service in FY 1988 (April 1988 - March 1989).

CSO: 4120/308

NEC NAMED TO PRODUCE NIKE SPARE PARTS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 535, 19 Aug 81 p 7

[Text]

The ASDF has named Nippon Electric Co. (NEC) to serve as the prime contractor for license production of spare parts for its Nike-J surface-to-air missile system to cope with the U.S. Army's suspension of spare parts supply to Japan through the Foreign Military Sales channel in 1985, according to Gen. H. Toyoshima, head of the Supply Headquarters.

NEC will undertake production of the spare parts, maintenance of the Nike-J system, quality control on the parts, management of technical materials and countermeasures for Nike-J technical problems. It will be responsible for these jobs as long as the ASDF operates the Nike-J system. NEC will utilize NEC Radio Equipment Engineering and Hitachi Shonan Electronics as subcontractors for spare parts production.

The ASDF will determine specific spare parts for NEC's production after receiving a proposal from it by mid-October. It may give top priority to economy in selection of the spare parts for license production.

CSO: 4120/308

MSDF TO DELAY FULL-SCALE PROCUREMENT OF NEW K-X MINES

Tokyo JPE AVIATION REPORT-WEEKLY in English No 535, 19 Aug 81 p 11

[Text]

The MSDF is expected to delay full-scale procurement of the improved-version K-X wire-moored mines until FY 1983 depending on results of the ongoing final tests, according to observers.

The JDA's Technical R&D Institute (TR&DI) has been developing the new K-X since FY 1973 in a follow-up to engineering development of the B-X sunken mine. Full-scale deployment of the Model 80 B-X mine started in FY 1980. The FY 1981 budget includes ¥1,000 million for B-X procurement.

The TR&DI carried out engineering development of the new K-X in FY 1977 at cost of ¥500 million, followed by technical and application tests starting in the latter half of FY 1978. Final functional tests have been under way since FY 1980. Although service entry certification had been expected for the end of the current fiscal year to pave the way for full-scale deployment from FY 1982, observers now speculate that there will be a delay.

The TR&DI is designing the new K-X to be laid far deeper than the existing K-X wire-moored mine. To that end, durability of the rope wire may be improved along with the mine's striking power.

CSO: 4120/308

END

JPRS 79155

6 October 1981

Japan Report

No. 135

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in *Government Reports Announcements* issued semi-monthly by the National Technical Information Service, and are listed in the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79155

6 October 1981

JAPAN REPORT

No. 135

CONTENTS

MILITARY

JDA Unveils FY 1982 Budget Request
(JPE AVIATION REPORT-WEEKLY, 9 Sep 81) 1

SCIENCE AND TECHNOLOGY

Economy of Coal Utilization, Future Prospects
(Akira Senmura; SHO-ENERUGI, Mar 81) 10

Oil Industry Relief Measures Approved, Selling Prices Not Set
(JAPAN PETROLEUM, ENERGY WEEKLY, 24 Aug 81) 26

Panel Urges Diversifying of Foreign Coal Import Sources
(JAPAN PETROLEUM, ENERGY WEEKLY, 31 Aug 81) 29

TDA Commissions IHI To Repair A300 Engines
(JPE AVIATION REPORT-WEEKLY, 2 Sep 81) 36

Advisory Council Support Private Takeover of NAMCO
(JPE AVIATION REPORT-WEEKLY, 2 Sep 81) 37

JDA To Name MT-X Prime Contractor
(JPE AVIATION REPORT-WEEKLY, 2 Sep 81) 40

Jet Engine for Drone To Be Developed
(JPE AVIATION REPORT-WEEKLY, 2 Sep 81) 42

SJAC Space Industry Report for FY 1979
(JPE AVIATION REPORT-WEEKLY, 2 Sep 81) 43

MITI Moves Toward Reorganization of Oil Industry
(JAPAN PETROLEUM & ENERGY WEEKLY, 7 Sep 81) 44

MITI Likely To Support Mitsui Pullout From IJPC
(JAPAN PETROLEUM & ENERGY WEEKLY, 7 Sep 81) 47

Firms Rate Hazardous Countries for Investment Purposes
(JAPAN PETROLEUM & ENERGY WEEKLY, 7 Sep 81) 49

Kawasaki Picked as MT-X Prime Contractor
(JPE AVIATION REPORT-WEEKLY, 9 Sep 81) 51

MITI Demands ¥1,502 Million for Y-XX Program
(JPE AVIATION REPORT-WEEKLY, 9 Sep 81) 52

MILITARY

JDA UNVEILS FY 1982 BUDGET REQUEST

Tokyo JPE AVIATION REPORT-WEEKLY in English No 537, 9 Sep 81 pp 1-9

[Text] The Japanese Defense Agency (JDA) has announced its FY 1982 budget request, totaling ¥2,580,100 million; up 7.5 percent over FY 1981, giving priority to hastened obtainment of main defense equipment. The total includes ¥295,200 million for the Defense Facilities Administration Agency (DFAA).

The budget request also calls for ¥1,637,600 million in disbursement from FY 1983 on, for the obtaining of equipment. This figure represents a 2.3-fold increase over the current fiscal year.

Requested funds for aircraft obtainment, mostly in disbursement from FY 1983 on, score a conspicuous increase of 7.2 times. Major aircraft for FY 1982 funding include 43 F-15J fighter-interceptors for the Air Self-Defense Force (ASDF), 17 P-3C antisubmarine warfare (ASW) aircraft for the Maritime Self-Defense Force (MSDF) and 22 AH-1S antitank helicopters for the Ground Self-Defense Force (GSDF). Funds for obtaining ammunition also show a notable gain of 83.7 percent.

For service, the GSDF requests a 2.4 percent rise in terms of FY 1982 disbursement alone, the MSDF a 9.2 percent gain, and the ASDF a 13.6 percent increase.

The Technical R&D Institute (TR&DI), seeks a 17.9 percent rise so that its share in the FY 1982 total defense spending would increase to 1.45 percent from 1.31 percent in FY 1981.

The JDA internal bureaus' request scores a sharp 22.5 percent gain because of massive funds for the construction of a central command post.

According to the JDA's FY 1982 operations plan, attached to the budget request, the GSDF will acquire 60 tanks, 14 aircraft, two Tan-SAM short-range surface-to-air missile sets and other equipment in the next fiscal year. GSDF equipment planned for FY 1982 ordering includes: 80 tanks, 19 203mm self-propelled howitzers, 13 command/communications armored personnel carriers, 36 aircraft, improved Hawk surface-to-air missiles for one Hawk group, Tan-SAMs and portable SAMs.

The MSDF will take delivery of seven ships (22,280 tons), 13 aircraft, including five P-3Cs, and other equipment, and order 10 ships (17,430 tons), 39 aircraft (including 17 P-3Cs), and others.

The ASDF will acquire 28 aircraft and other equipment, and place orders for 61 aircraft, Tan-SAMs, portable SAMs, and others.

The TR&DI will launch full-scale development work on the XSSM ground-launched antiship missile, the new main battle tank, the new antiaircraft gun, the Chu-MAT antitank missile and other new weapons systems.

A breakdown of the FY 1982 budget request follows:

(Comparison with previous years)

- Unit: ¥100 mil. -	FY '80 Appropriation	FY '81 Appropriation	FY '82 Request
Total	22,301	23,999	25,801
Compared with previous year	106.5%	107.6%	107.5%
1. JDA & SDF	19,705	21,254	22,849
Compared with previous year	106.4%	107.9%	107.5%
2. DFAA	2,596	2,745	2,952
Compared with previous year	107.4%	105.7%	107.6%

(Organization-by-organization breadown)

- Unit: ¥1 mil. -	FY '82 Request(A)	FY '81 Appropriation(B)	Up (A)-(B)	Up (A)/(B)-100
GSDF	966,878	944,308	22,570	2.4%
MSDF	604,239	553,163	51,076	9.2
ASDF	641,638	564,635	77,003	13.6
sub total	2,212,755	2,062,106	150,649	7.3

- Unit: ¥1 mil. -	FY '82 Request(A)	FY '81 Appropriation(B)	Up (A)-(B)	Up (A)/(B)-100
Internal Bureaus	8,672	7,078	1,594	22.5%
Joint Staff Council	949	905	44	4.8
Defense Staff College	680	649	31	4.7
Defense Academy	9,412	9,041	371	4.1
Defense Medical College	11,131	10,089	1,042	10.3
Technical R&D Institute	37,401	31,711	5,690	17.9
Central Procurement Office	3,900	3,844	56	1.5
sub total	72,145	63,317	8,828	13.9
Total	2,284,900	2,125,423	159,477	7.5

Aircraft

The FY 1982 budget request earmarks ¥774,646 million for 136 aircraft, consisting of 36 for the GSDF, 39 for the MSDF and 61 for the ASDF. If the aircraft request is approved, the JDA is certain to achieve aircraft funding targets stipulated in the FY 1980-84 Medium-Term Defense Program ahead of schedule. The request gives priority to 22 AH-1S antitank helicopters for the GSDF, 17 P-3C antisubmarine patrol aircraft for the MSDF and 43 F-15J fighter-interceptors for the ASDF.

The Aircraft request is broken down as follows:

	Number	Value (mil. yen)	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
GSDF				
AH-1S helicopters	22	42,463	685	41,778
OH-6D helicopters	6	1,222	74	1,148

	Number	Value (mil. yen)	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
HU-1H helicopters	7	3,665	269	3,396
LR-1 turboprop	1	523	35	487
sub total	36	47,873	1,064	46,809
MSDF				
P-3C ASW aircraft	17	188,294	1,073	187,221
KM-2 trainers	2	317	24	293
TC-90 trainers	3	1,514	170	1,344
HSS-2B ASW helicopters	11	28,515	649	27,867
S-61A rescue helicopters	4	6,805	186	6,618
OH-6D helicopters	2	406	25	381
sub total	39	225,850	2,127	223,724
ASDF				
F-15J fighters	43	450,650	4,407	446,243
F-1 support fighters	3	6,970	212	6,758
C-130H transports	4	22,985	1,707	21,277
T-2 advanced trainers	7	16,498	663	15,835
MU-2 rescue aircraft	2	1,062	78	984
V-107A rescue helicopters	2	2,757	208	2,549
sub total	61	500,922	7,277	493,645
Total	136	774,646	10,468	764,178

GSDF Ground Equipment

The FY 1982 budget request sets aside a record ¥52,511 million for Class "A" GSDF ground equipment with the emphasis put on tanks, self-propelled artillery and antitank weapons systems. A new item is the command communications armored personnel carrier (APC) developed by the TR&DI.

The Class "A" GSDF ground equipment request is broken down as follows:

	Number	Value (mil. yen)	FY '82 Expenditure (mi. yen)	Follow-on Disbursement (mil. yen)
New type pistols	1,800	151	0	151
Model 64 rifles	5,000	810	0	810
Model 62 machine guns	51	96	0	96
Model 74 machine guns	38	98	0	98
84mm recoilless guns	221	482	0	482
Model 79 Ju-MAT missile launchers	8 (sets)	487	0	487
Model 64 81mm mortars	43	120	0	120
Model 75 155mm self-propelled howitzers	40	10,984	0	10,984
203mm self-propelled howitzers	19	5,534	235	5,299
Model 75 130mm multi-barreled rocket launchers	8	1,632	0	1,632
Model 75 wind measuring vehicles	3	338	0	338
Model 74 tanks	80	27,638	0	27,638

	Number	Value (mil. yen)	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
Model 73 APCs	9	899	0	899
Command/ communications APCs	13	1,024	0	1,024
Model 78 tank recovery vehicles	5	1,135	0	1,135
Model 78 snow vehicles	22	599	0	599
Model 70 pontoons	3	483	0	483
Total		52,511	235	52,276

Shipbuilding

The FY 1982 MSDF shipbuilding request calls for ¥252,778 million, compared with ¥194,901 million in FY 1981, to finance building of 10 warships, five auxiliary vessels and a DSRV (deep submergence rescue vehicle) for a 3,600-ton AS submarine tender, and rehabilitation and modernization of two ships. The 10 warships include four 2,900-ton DDs, and one 1,400-ton DE destroyer. The five auxiliary vessels are one 490-ton YO fuel oil barge, one 270-ton YO, one 200-ton YT tugboat, one 30-ton YT and one 50-ton YL salvage lift. The 15 ships' tonnage amounts to 18,470 tons.

A new item in the 10 warships is a 250-ton PG missile-armed patrol gunboat for pre-deployment evaluation.

The MSDF shipbuilding request is broken down as follows:

	Number	Tonnage	Value (mil. yen)	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
2,900-ton DDs	4	11,600	147,972	2,586	145,387
1,400-ton DE	1	1,400	20,157	601	19,556
2,200-ton SS	1	2,200	31,472	327	31,146

	Number	Tonnage	Value (mil. yen)	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
440-ton MSCs	2	880	9,135	15	9,120
250-ton PG	1	250	2,788	265	2,523
1,100-ton AGS	1	1,100	7,017	654	6,364
DSRV	-	-	14,371	552	13,819
sub total	10	17,430	232,912	4,998	227,914
Auxiliary ships	5	1,040	1,093	741	352
FRAM program			18,773	1,119	17,654
Total	15	18,470	252,778	6,858	245,920

Military R&D

The TR&DI's FY 1982 budget request totals ¥37,401 million; up 17.9 percent over FY 1981, including ¥16,886 million for research and development of new defense equipment. In addition, it requests ¥34,631 million in disbursement from FY 1983 on for R&D programs.

Major R&D items for FY 1982 include: the XSSM ground-launched antiship missile, the Chu-MAT medium-range antitank missile, the portable SAM, the air combat missile, the new antimortar radar, the ALR-1, ALQ-5 and ALQ-8 electronic countermeasure systems, the new main battle tank, the AW-X self-propelled antiaircraft gun, the new mortar (and its ammunition), the 20mm projectile, the new diesel engine for minesweepers, the towed passive sonar, the GRX-2 high-speed homing torpedo, the highly tensile rolled steel for future submarines, the ship noise reduction measures, the deep-minesweeping system, the new mine, the MT-X intermediate trainer and the target drone.

The main part of the requested R&D funds is broken down in categories as follows:

	Number of R&D items	FY '82 Expenditure (mil. yen)	Follow-on Disbursement (mil. yen)
Guided weapons	8	1,526	8,109
Electronic equipment	14	1,565	4,169
Firearms and vehicles	7	1,888	11,284
Ships and underwater weapons	10	1,464	2,450
Aircraft	4	980	6,605
Total	43	7,423	32,617

Guided Weapons

The FY 1982 budget request earmarks ¥70,182 million (¥4,879 million in FY 1982 expenditure) for Nike-J, improved Hawk, Tan-SAM short-range and portable surface-to-air missiles. The total consists of ¥30,880 million (¥1,369 million in FY 1982 expenditure) for GSDF improved Hawks, ¥669 million (¥201 million) for ASDF Nike-Js, ¥35,549 million (¥1,767 million) for 12 Tan-SAM sets, and ¥3,084 million (¥1,542 million) for 88 portable SAM sets.

The GSDF improved Hawks will be used for modernization of the fifth Hawk group. The Nike-J request will be for improving radar equipment. The Tan-SAM and portable SAM missiles will be deployed for northern GSDF divisions and ASDF bases.

Command/Communications Systems

The JDA requests ¥2,061 million in FY 1982 expenditure and ¥4,698 million in follow-on disbursement for the construction of a central command post for a unified command of the three SDF services. Obtainment of hardware equipment and additional construction work are planned for FY 1982 after construction of a building at the JDA.

The central command post, to be completed in FY 1983, will link the ASDF BADGE air defense system, the GSDF microwave communications system and the MSDF SF fleet command and support system.

The JDA also earmarks in the FY 1982 budget request ¥1,981 million in FY 1982 expenditure and ¥3,502 million in follow-on disbursement for the final-phase construction of the GSDF microwave communications system.

As for the ASDF BADGE system, the JDA plans to select a new system in FY 1982 before its construction from FY 1983 to 1987.

CSO: 4120/3

SCIENCE AND TECHNOLOGY

ECONOMY OF COAL UTILIZATION, FUTURE PROSPECTS

Tokyo SHO-ENERUGI in Japanese Vol 33, No 3, Mar 81 pp 6-13

[Article by Akira Senmura, head scientist at Japan Energy Economics Institute]

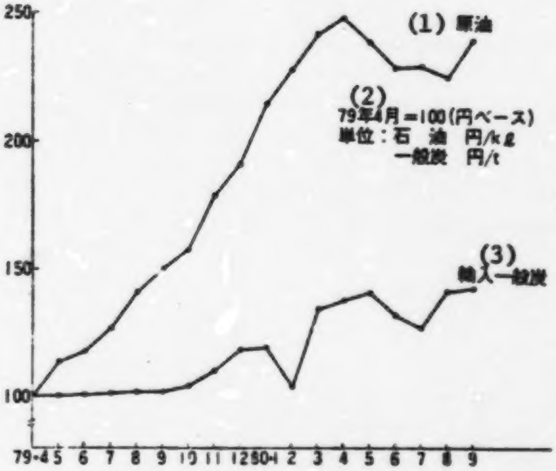
[Text] 1. Present Economic Characteristics of Coal Use

1-1 Overview

The desire to reconsider coal has grown rapidly since the autumn of 1979. The greatest factor in this increase is, if anything, the jump in oil prices which followed the Iranian revolution and the resulting second oil crisis; coal prices were stable by comparison, and the use of coal became markedly more economical. As shown in Table 1 the CIF price of crude oil increased by about 120 percent from $15.40/barrel in April 1979 to $34.60/barrel, while the CIF price of coal increased only about 40 percent during the same period, from $41.33/ton to $58.59/ton. Moreover, between April and December of 1979, crude oil had made a sharp jump of 60 percent to $25.36/barrel but coal remained almost level, increasing 2 percent to $42.47/ton. Because of this difference in price trends during that period, coal use became markedly more economical and the desire to reconsider coal became much more widespread.

Figure 1, in which CIF prices are indexed at 100 as of April 1979, clearly shows the difference between crude oil and coal price increases between 1979 and the beginning of 1980, and the greatly increased price superiority of coal. When the unit price per 10^3 kcal is compared (after figuring in a 20-percent penalty against coal for inconvenience of handling), the unit price of coal was 83 percent that of crude oil in April 1979 but 46 percent that of crude oil in January 1980. Thus the advantage of using coal increased greatly.

With this marked increase in the economic advantage of using coal in 1979 in the background, the cement industry and others in Japan became involved in a fierce struggle to buy up coal from overseas from the beginning of 1979 through the beginning of 1980; as a result the price of coal, which had been about $40/ton in the first quarter, ranged up between $47 and $59 in the last three quarters of that year.



Key:
1. Crude oil
2. Apr 79 = 100 (yen based); unit: yen/kl oil, yen/ton coal
3. Import coal

Figure 1. Price Trend of Crude Oil and Coal

Table 1. Trend of CIF Prices of Crude Oil and Coal

(1) 年 月	原 (2) 油		(5) 一 般 炭		輸入レート (8)
	ドル/バレル (3)	円/kl (4)	円価格 (6)	ドル価格 (7)	円/ドル
'79年4月	15.40	20,428	8,715	41.33	210.87
5月	16.62	22,764	8,721	40.04	217.81
6月	17.29	23,901	8,774	39.91	219.83
7月	18.75	25,617	8,846	40.72	217.24
(9) 8月	21.13	28,701	9,223	42.67	216.13
9月	22.06	30,605	8,888	40.30	220.54
10月	22.72	32,210	9,126	40.49	225.41
11月	24.37	36,557	9,682	40.60	238.48
12月	25.36	39,013	10,369	42.47	244.62
'80年1月	29.20	43,651	10,438	43.92	237.68
2月	30.83	46,606	9,160	38.11	240.35
3月	31.75	49,421	11,715	47.34	247.44
4月	31.91	50,666	12,055	47.76	252.39
5月	32.49	48,781	12,290	51.44	238.71
6月	33.45	46,591	11,533	52.08	221.44
7月	34.17	46,849	11,028	50.60	217.95
8月	33.96	48,027	12,738	56.65	224.85
9月	34.60	48,929	12,837	58.59	219.10

出所：日本貿易月表 (10)

Key:
1. Month
2. Crude oil
3. Dollars/barrel
4. Yen/kl
5. Coal
6. Yen price
7. Dollar price
8. Import exchange rate--yen/dollar
9. Apr 79, May 79 ... Sep 80
10. Source: Japan Monthly Trade Statistics

The increase was not so great on a yen basis because of the appreciation of the yen during that period; between January and September of 1980 it was 33 percent on a dollar basis, but only 23 percent on a yen basis. Thus in September 1980 the unit price of 10^3 kcal in crude oil was 5.21 yen but for coal (including the 20-percent penalty) it was 2.65 yen--51 percent of the crude oil price. This is almost the same as the 52 percent in December 1979. This means that even though the large increase in the import price of crude oil caused the import price of coal to go up from March 1980 on, the price differential remained about the same as at the end of 1979, so the use of coal continued to be very economical.

Because of the economic advantage of using coal there are many customers who would like to use it, but despite the great potential demand for coal, the supply systems in Australia and other producer countries make it impossible for supply to meet demand. Thus spot purchases are made at unreasonably high prices, driving up the market price of coal.

Let us examine how the potential demand for coal came to be so great. Table 2 shows coal imports by country of origin: imports of coal began to increase in the second half of fiscal 1979 and the primary source was Australia. As stated above, this reflected the increased economic advantage of using coal seen in 1979. Only Australia was able to immediately increase supplies to meet the increased demand in Japan. These increased imports of coal from Australia and the other sources, were, however, the result of excessive competition in buying coal which pushed coal prices up.

Table 2. Trend of Import Coal Receipts

(1)（単位：千t）

	(2) 国別	(3) 53 年度			(7) 54 年度			(8) 55年度
		(4) 上期	(5) 下期	(6) 計	(4) 上期	(5) 下期	(6) 計	(4) 上期
(9)	中国	71.4	110.1	181.5	118.1	121.1	239.2	363.2
(10)	ソ連	83.2	40.2	123.5	29.2	94.6	123.8	110.3
(11)	豪州	327.6	340.8	668.4	441.0	845.8	1,296.8	1,620.1
(12)	南アフリカ	5.4	19.5	24.9	21.0	—	21.0	85.6
(13)	カナダ	—	12.2	12.2	0.2	—	0.2	164.0
(14)	米国	—	—	—	—	—	—	88.4
(15)	インドネシア	—	—	—	3.8	—	3.8	9.0
(16)	計	487.6	522.9	1,010.5	613.2	1,061.5	1,674.7	2,440.7

Key:

1.	(Unit: 1,000 tons)	9.	PRC
2.	Country	10.	Soviet Union
3.	Fiscal 1978	11.	Australia
4.	First half	12.	South Africa
5.	Second half	13.	Canada
6.	Total	14.	U.S.
7.	Fiscal 1979	15.	Indonesia
8.	Fiscal 1980	16.	Total

Industry-by-industry trends in the consumption of imported coal show that in the last half of fiscal 1979 consumption increased greatly in the glass and ceramics industry--specifically the cement industry. In the cement industry, SO_x and ash are mixed into the raw material so NO_x regulations are the only problem in terms of environmental protection, and conversion to coal is relatively easy because the only facilities needed are a coal crushing mill and a coal burner and because it is not necessary to consume large amounts. Moreover, the cost of kilning the raw materials makes up 40 to 50 percent of the cost of producing cement, so the major task of management is to reduce production costs by using the cheapest fuel possible. It is for these reasons that cement is the industry that has gone the furthest in conversion to coal. In August and September 1979 the cement industry was consuming about 400,000 tons per month, an annual rate of 4.8 million tons of coal. It is safe to say the cement industry has almost achieved its planned goal of 50 percent conversion to coal in the first year. After the cement industry, the greatest effort to convert to coal is seen in the electric power industry. In July 1980 consumption of imported coal by the power industry rose to 100,000 tons per month; in the first half of fiscal 1980 it used about 430,000 tons, some four times the 100,000 tons used in the second half of fiscal 1979. Some oil-burning thermoelectric power plants were originally designed to burn coal and later converted to oil.

Reconversion of these plants and raising the proportion of coal burned at the coal burning plants brought about this increase in coal consumption. Incidentally, the full-scale construction of import coal burning power plants has had to await the Matsushima No 1 plant of the Electric Power Development Co., scheduled to begin operation in January 1981. Other manufacturing industries doubled their consumption of imported coal to 190,000 tons in the first half of fiscal 1980 from 90,000 tons in the latter half of 1979, but the amount is quite small in comparison with consumption by the cement and power industries.

As stated above, on the occasion of the second oil crisis the cement industry quickly began conversion to coal in the latter half of fiscal 1979; this reflected the marked increase in the economic advantages of using coal. The electric power industry is also converting to coal, but it has not been possible to secure supplies adequate to meet the deep-rooted potential demand for coal. This has not only driven up the market price of ordinary coal, but has affected the price of coking coal as well.

1-2 Economy of Expanded Coal Use in Major Industries

Let us now consider the economic advantages of expanded use of coal in major industries based on the fuel price assumptions in Table 3.

(1) Steel Industry

Conversion to oil-less blast furnace operation--all coke operation--without fuel oil--became widespread in the steel industry from the fall of 1979 through the first half of 1980.

Table 3. Fuel Price Assumptions

(1) C重油（S分 3%）	(2) C重油（S分 0.3%）	(3) 海外一般炭	(4) 国内一般炭
53,000円/kl (5)	39,900円/kl (5)	16,500円/t (6)	19,000円/t (6)

(7) 注1）H.S.C重油については55年10～12月期鉄鋼向け価格

(8) 注2）L.S.C重油については55年10～12月期電力向け仮払い価格

(9) 注3）海外一般炭と国内一般炭については，55年9月時点での工場着のモデル工場着価格

Key:

1. C fuel oil (sulfur content 3%)
2. C fuel oil (sulfur content 0.3%)
3. Imported coal
4. Domestic coal
5. Yen/kl
6. Yen/ton
7. Note 1) 4th quarter price of high sulfur C fuel oil for steel makers, 1980
8. Note 2) 4th quarter price of low sulfur C fuel oil for power companies, 1980
9. Note 3) model delivered prices of imported and domestic coal as of September 1980

Table 4 shows blast furnace operation by fuel type for the five major operators (as of the end of October 1980): of the 38 furnaces being used, 20 were on all coke operation. If we include those which made use of tar produced as a byproduct of coke furnaces, there were 24 oil-less blast furnaces, or 63 percent of the 38 furnaces in operation. Thus for every 35 kg of fuel oil the five major steel producers used in 1978 before the second oil crisis, they used 10 kg, less than one-third, in October of 1980.

Table 4. Major Steel Makers' Blast Furnace Operations by Fuel

(1) 会社名	(2) 稼動中の高炉数	(3) 重油吹込み	(4) オールコークス	(5) タール吹込み
(6) 新日本製鉄	16	8	7	1
(7) 日本鋼管	5	0	4	1
(8) 川崎製鉄	6	1	5	0
(9) 住友金属工業	6	3	1	2
(10) 神戸製鋼	5	2	3	0
(11) 合計	38	14	20	4

(12)（昭和55年10月末現在）

Key:

1. Company
2. Furnaces in operation
3. Fuel oil blown in
4. All coke
5. Tar blown in
6. Nippon Steel Corp.
7. Nippon Kokan K.K.
8. Kawasaki Steel Corp.
9. Sumitomo Metal Industries
10. Kobe Steel Ltd.
11. Total
12. (as of the end of October 1980)

By contrast, the relative amount of coke used rose from 426 kg in 1978 to 455 kg in November 1980. But even though the relative amount of coke used rose, because it is far more economical than fuel oil profits rose to 643 yen per ton or 55.9 billion yen per year for the entire industry, as shown in Table 5. This does not include profit from the increase in gas generated as a byproduct of coke use; if this gas were valued by calorie equivalency to heavy oil, the merits of coal conversion would be further increased.

Table 5. Advantage of Expanded Coal Use to Steel Industry (1980)

	高炉燃料比 (1)(kg)	燃料単価 (2)(円/t)	燃料費 (3)(円/t)
コ (4) クス	455 426	20 20	9,100 8.520
重 (5) 油	10 35	53 53	530 1,855
タ (6) ル	7 5	51 51	357 255
(7) 計	472 466		9,987 10,630

(8) 注1）上段の高炉燃料比は55年11月の大手5社の実績
(9) 注2）下段の高炉燃料比は53年の実績
(10) 注3）タールの価格は重油とカロリー等価とする

t当り便益(円/t) (11)	高炉銑(万t) (12)	便益計(億円) (13)
643	8,700	559

Key:

1. Blast furance fuel use (kg)
2. Unit cost of fuel (yen/ton)
3. Fuel cost (yen/ton)
4. Coke
5. Fuel oil
6. Tar
7. Total
8. Note 1) Upper figure is November 1980 average of the five major steel makers
9. Note 2) Lower figure is the 1978 average
10. Note 3) Tar cost based on calorie equivalent of fuel oil
11. Profit per ton (yen/ton)
12. Blast furnace pigs (10,000/t)
13. Total profit (100 million yen)

(2) Electric Power Industry

Tables 6 and 7 compare the first year cost of producing 1 million kilowatts in 1980: atomic energy is lowest at 11 yen/kWh (all figures exclude transmission costs), followed by coal at 14 yen/kWh, and LNG and fuel oil at the relatively high levels of 17 and 19 yen/kWh.

Breaking down these costs, we see that for generation of power from LNG and heavy oil, the proportion of capital costs is low--18 to 27 percent--and fuel costs make up a large share--65 to 75 percent. By contrast, capital costs for coal and atomic energy are high--38 to 59 percent--and fuel costs are lower at 24 to 38 percent. In other words, low fuel costs make up for the high construction costs of coal and atomic power plants and allow power generation at a low cost. Thus the best course for the power industry would be to go ahead with construction of atomic facilities to produce low cost electricity, but in practice the siting of atomic power plants is greatly delayed by strong antinuclear sentiment among local residents. Although coal, on the other hand, still has a dirty image, the use of integrated exhaust treatment systems has made it possible to apply environmental regulations comparable to those for oil-burning power plants, and so construction of coal-burning plants is going forward actively.

But power from coal is faced with more than a few problems: in addition to the image among the citizenry as a polluter, coal requires extensive harbor facilities and twice as much land as oil-burning facilities. Construction is not going forward as rapidly as planned; coal faces the siting difficulties as other sources of electricity.

Table 6. Relative Cost of Generating Electricity (First Year Cost per 100 kW If Operation Begun in 1980)

(1) 項目	(2) 原子力			(3) LNG火力			(4) 重油火力			(5) 石炭火力			(6) 備考
(7) 建設費（億円）		2,300			1,610			1,220			2,010		設備利用率70% 熱効率 38% 建設費 ①石炭火力本体 重油火力本体×1.45 ②LNG（含.基地建設費） 重油火力本体×1.35 (15)
(8) 発電所本体		2,300			1,110			1,190			1,730		
(9) 排煙装置・LNG基地					500			30			280		
(10) 所内率		3.3			2.1			3.4			7.6		
(11) 発電電力量（$\times 10^6$kWh）		6,132			6,132			6,132			6,132		
(12) 送電電力量（$\times 10^6$kWh）		5,948			6,003			5,924			5,666		
(13) 燃料発熱量					13,300kcal/kg			9,700kcal/l			6,450kcal/kg		
(14) 燃料消費量					104万t			143万kl			231万t（湿炭ベース）		
(16) 初年度コスト（百万円）	経費率 (17)		%	経費率 (17)		%	経費率 (17)		%	経費率 (17)		%	
(18) 資本費	0.1734	39,982	58.6	0.174	28,014	27.9	0.174	20,706	18.3	0.174	30,102	37.6	
(19) 運転費	0.0524	12,052	17.7	0.0424	6,826	6.8	0.0424	5,046	4.5	0.0424	7,335	9.2	
(20) 排煙処理費		—			—			1,901	1.7		12,044	15.0	
(21) 運炭灰捨費		—			—			—			520	0.6	
(22) 燃料費		16,167	23.7		65,520	65.3		85,657	75.6		30,030	37.5	
(23) 計（発電端）		68,101 (11.11円/kWh) (24)			100,360 (16.37円/kWh) (24)			113,310 (18.48)			80,031 (13.05)		
(25) 計（送電端）		68,101 (11.45円/kWh) (24)			100,360 (16.72)			113,310 (19.13)			80,031 (14.12)		

Key:

1. Item
2. Atomic energy
3. LNG fired
4. Fuel oil fired
5. Coal fired
6. Notes
7. Construction cost (100 million yen)
8. Power plant building
9. Exhaust equipment - LNG base
10. Proportion
11. Power generated (x 10^6 kWh)
12. Power transmitted (x 10^6 kWh)
13. Heat from fuel
14. Fuel used
15. Facility utilization 70%; thermal efficiency 38%; construction cost: (1) coal fired plant is 1.45 times cost of fuel oil fired plant, (2) LNG (including cost of base construction) plant is 1.35 times cost of fuel oil fired plant
16. First year cost (million yen)
17. Outlay rate
18. Capital costs
19. Operating costs
20. Pollution control costs
21. Clinker disposal costs
22. Fuel costs
23. Total (at generator)
24. yen/kWh
25. Total (at transmission point)

Table 7. Power Cost Comparison Premises

	(1) 原子力	(2) LNG火力	(3) 重油火力	(4) 石炭火力
(5) ケース設定	在来計算方式による（除，デコミッショニングコスト，及び低レベル放射性廃棄物の管理コスト） (6)		(7) 脱硝：50%装備 脱硫：装備せず L.S重油にて対処	脱硫 脱硝 100%装備 (8)
(9) 燃料価格	(A) 表 (10)	63,000円/t (11) (55年9月のCIF価格)	59,900円/kl (12)	13,000円/t (55年9月のCIF価格) (13)

(A) 核燃料サイクルの要素価格見通し (10)

(10a) ウラン精鉱		(10b) 転換	(10c) 濃縮	(10d) 成型加工	(10e) 使用済燃料輸送	(10f) 再処理
$/lb$U_3O_8$	$/kg$U_3O_8$	$/kg-U	$/kg·swu	$/kg-U	$/kg-U	$/kg-U
32	70	6	98	417	140	700

(14) 注）炉心期間は4年，転換，濃縮は初装荷の2年前，成型加工はその1年前と想定した。また使用済燃料を炉からとり出し輸送するまでの期間は1年，また再処理の終了時点までの期間は2年と想定した。なお長期割引き戻し率は8%と想定した。
主な炉特性データは熱効率33.2%，燃焼度29,500MWD/t，設備利用率70%，初装荷量108.55t

Key:

1. Atomic energy
2. LNG fired
3. Fuel oil fired
4. Coal fired
5. Case
6. Conventional method of calculation (less decommissioning cost and cost of handling low level radioactive wastes)
7. 50% of nitrate removal equipment but no sulfate removal equipment--low sulfur fuel oil assumed
8. 100% of nitrate and sulfate removal equipment
9. Fuel cost
10. Cost forecast for phases of nuclear fuel cycle:

10a. Uranium milling
10b. Conversion
10c. Enrichment
10d. Fuel fabrication
10e. Spent fuel transportation
10f. Reprocessing

11. Yen/ton (September 1980 CIF price)
12. Yen/kl
13. Yen/ton (September 1980 CIF price)
14. Note) Time in reactor core is assumed to be 4 years, with conversion and enrichment taking place 2 years before initial loading and fuel fabrication 1 year before loading. It is assumed transportation is 1 year following removal of spent fuel from reactor and that reprocessing is completed 2 years after removal. The long term return rate is 8%. Reactor characteristics are 33.2% fuel efficiency, 29,500 MWD/t combustion, 70% facility utilization, and 108.55 t initial load.

(3) Cement Industry

As stated above, cement is the industrial sector in which conversion to coal has proceeded most rapidly. Table 8 shows that under the plan for 50 percent conversion to coal during fiscal 1980 there are great advantages: the 96.9 billion yen gained from coal conversion allows recovery of the investment in conversion (87.0 to 129.0 billion yen) in about 1 year. The cement industry plans to achieve 90 percent conversion as quickly as possible, and its coal consumption will be in excess of 10 million tons. But because Australian coal, including newly exploited coal, has been sold up through 1984, it will be difficult to secure supplies adequate for the needs of the cement industry.

Even so, it is possible to post adequate profit from company income using 6 million tons of coal with 50 percent coal conversion in 1980; the cement industry has recently taken a relatively calm and settled attitude toward the tight market conditions for coal.

Table 8. Advantage of Coal Conversion to Cement Industry

(1) クリンカー生産量（万t）	(2) 重油原単位（l/t）	(3) 重油必要量（万kl）	(4) 石炭換算必要量（万t）	(5) 石炭消費量（万t） 重油消費量（万kl）
8,850	87	770	1,261	630 385

(6) 注）石炭転換率は50%

(7) ① 燃料費（億円）	② 差(8)額（億円）	(9) ③ 転換投資額（億円）	(10) ④=③/②（年）
3,112 (4,081)	969	870～1,290	0.90～1.33

(11) 注1）石炭価格は海外炭80%，国内炭20%の加重平均
(12) 注2）転換投資額は興銀調べと開銀調べ
(13) 注3）（　）内は重油専焼の場合で，差額は石炭転換率50%の場合と重油専焼の場合との差

Key:

1. Clinker produced (10,000 tons)
2. Fuel oil source unit (liter/ton)
3. Fuel oil required (10,000 kl)
4. Coal required under conversion (10,000 tons)
5. Coal consumed (10,000 tons)
   Fuel oil consumed (10,000 kl)
6. Note) 50% conversion to coal
7. Fuel cost (100 million yen)
8. Difference (100 million yen)
9. Investment in conversion (100 million yen)
10. (year)
11. Note 1) Coal cost is weighted balance of 80% imported coal and 20% domestic coal
12. Note 2) Amount to be invested in conversion based on studies by Industrial Promotion Bank and the Japan Development Bank
13. Note 3) The figure in parentheses is the difference between the cost if just fuel oil is burned and the cost with 50% conversion to coal

(4) Paper and Pulp Industry

Table 9 shows that in the case of a new 260 t/h boiler, the unit cost of steam is 4,310 yen/ton with a heavy oil boiler and 4,210 yen/ton with a coal boiler, so new coal-fired boilers have the advantage. In fact, five new coal boilers are planned for construction by fiscal 1985: 250 t/h at Daishowa Paper's Iwanuma mill, 300 t/h at Sanyo-Kokusaku's Yufutsu mill, 200 t/h at Mitsubishi Paper's Hachinohe mill, 350 t/h at Daio Paper's Mishima mill and 200 t/h at Otake Industries.

Table 9. Steam Cost Comparison for New Boilers in the Paper and Pulp Industry

		(1) 1980 年完成		
		重油ボイラ (2)	石炭ボイラ (3)	(4) 備考
(5) 建設費 (A)		29.5	88.48	脱硝あり (6)
(7) 固定費	(8) 資本費	6.49	18.01	
	(9) 直接費 人件費	0.32	0.64	重油 2名×4直×@400万円 石炭 4名×4直×@400万円 (19)
	修繕費	0.59	2.21	重油 (A)×2% 石炭 (A)×2.5% (20)
	(10) 間接費	0.14	0.43	直接費計×15% (21)
	(11) 計 (B)	7.54	21.29	
(12) 比例費	(13) 燃料費	63.75	39.6	蒸発力 重油14.5t/kl, 石炭 7.5t/t, 負荷率 0.8, (22) 稼働日 350日
	(14) 電力費	3.96	7.92	重油 1,300kW 石炭 2,600kW ×24×350×13.95円/kWh (23)
	(15) 脱硝剤	—	2.0	
	(16) 灰処理費	—	2.8	
	計 (C) (17)	67.71	52.32	
(B) + (C)		75.25	73.61	発生蒸気量 260t/h×0.8×24×350 (24) =1,747,200t/年
(18) 蒸気単価 (千円/t)		4.31	4.21	

Key:

1. Completed in 1980
2. Fuel oil fired boilers
3. Coal fired boilers
4. Notes
5. Construction costs (A)
6. With NOx removal equipment
7. Fixed costs
8. Capital costs
9. Direct costs--personnel costs
   --maintenance costs
10. Indirect costs
11. Total (B)
12. Variable costs
13. Fuel costs
14. Electricity
15. NOx removal

[Key continued on following page]

16. Ash disposal
17. Total (C)
18. Unit cost of steam (1,000 yen/ton)
19. —fuel oil: 2 men x 4 shifts x 4 million yen
    —coal : 4 men x 4 shifts x 4 million yen
20. —fuel oil: (A) x 2.0%
    —coal : (A) x 2.5%
21. Total of direct costs x 15%
22. Steam generation capacity 14.5 t/kl for fuel oil, 7.5 t/t for coal, load factor 0.8, days of operation 350
23. —fuel oil: 1,300 kW x 24 x 350 x 13.95 yen/kWh
    —coal : 2,600 kW x 24 x 350 x 13.95 yen/kWh
24. Volume of steam 260 t/h x 0.8 x 24 x 350 = 1,747,200 t/yr

So far the paper and pulp industry has been considering conversion to coal in the form of reactivation or reserve coal-fired boilers which had been retired but not dismantled, or reconversion of coal-fired boilers which had been converted to burn fuel oil, but now we can expect new large-scale coal boilers to be built. But under present conditions it will not be easy for the paper and pulp industry to secure supplies of coal which will be consumed in large quantities by the large boilers.

Additional difficulties faced by the paper industry are the fact that almost no mills are located near the coast and the fact that individual mills consume only small quantities of coal. Expanded use of coal will therefore require establishment of coal centers and secondary transportation facilities.

2. Prospects for Economy of Expended Coal Use

2-1 Short Range Prospects (1980-85)

Japan depends primarily on coal from Australia and that, newly exploited fields, has been sold out through 1984; it is not possible to secure supplies, beyond what is now under contract, from any company. Moreover, the existing U.S. coal terminals at Los Angeles and Long Beach are at the limits of their loading capacity.

In the PRC there will be a considerable delay in the expansion of the ports of Qinhuangdao and Shijiusuo which is being done with financial assistance in the form of yen loans, and in the building or electrification of connecting railroads. Infrastructure facilities are being provided for Canadian coking coal, but deposits are not large. It will thus be necessary to overcome numerous obstacles in order to greatly increase supplies of coal from countries other than Australia. And because that will take a long time, it would be quite difficult to expect a large supply of non-Australian coal by 1985.

Consequently it will be difficult to increase the supply of coal much above present levels prior to 1985. But considering the strong potential demand for coal, even a cautious attitude on the part of the cement industry and other coal users cannot prevent spot purchases at high prices, and sporatic spot purchases at high prices will pull up the market price of coal. And that may well pull up coal contract prices, including those of long term contracts.

In short, there is no hope for increased suppliers of coal prior to 1985, and assuming active coal purchasing from Europe and Southeast Asia as well as from Japanese consumers, there should be a considerable increase in the price of coal. However, increased purchases of Australian coal by the countries of Europe are due largely to short range factors like reduced exports of Polish and Soviet coal, and the Japanese cement industry and other coal users are taking a more cautious attitude toward coal purchases. Considering these points, it is not realistic to suppose that the present price differential between oil and coal will contract and coal prices will rise until they are at the same calorie-equivalent price level as fuel oil. But considering constraints on supply, we can assume there is little chance that the gap between oil and coal prices will grow wider.

2-2 Long Range Prospects (1985-90)

After 1985 it will be possible to expect increased production from new development projects in Australia and Canada, so if there is orderly progress on expansion of loading capacity, a considerable increase in coal supplies can be expected.

Thus a large increase in coal supplies, primarily Australian, can be expected. But even though there are large deposits and mines and loading facilities are built or expanded, there will be a striking concentration of demand on Australian coal and supplying coal will become increasingly risky unless U.S. and PRC coal, which could be imported in large quantities, is in fact developed and imported. In such a situation it would be impossible to satisfy the demand for coal which is expected to come from the power industry.

As for PRC coal, it is quite likely that there will be considerable delay in development of mines and provision of infrastructure, even though there has been financial assistance from Japan. In the case of U.S. coal, it is generally thought that it will be 1990 before railroads, ports and other infrastructure facilities are provided and large quantities of coal can actually be exported to Japan and the Far East.

In short, it can be expected that market conditions for coal will tend to be tight from 1985 on. Table 10 gives three scenarios for coal prices: In case I some productive capacity is expected but there is little chance that prices will be set in a way that benefits the buyer; in case II there is a strong likelihood that prices will be set in a way which benefits the seller. And in case III, even though market conditions will be tight, coal prices are unlikely to reach the calorie-equivalent price of oil.

In other words, if the present price differential between oil and coal is taken as the base and fuel oil prices are increased 10 percent annually for 10 years, the price of coal would have to rise at an annual rate of 17 percent to reach the calorie-equivalent price of fuel oil; it is hardly imaginable that coal prices will consistently rise at a rate higher than that of fuel oil.

Table 10. Coal Price

	.(1)　概　　要
(3) 短期見通し '80～'85年	(4)　豪州炭については新規開発分も含めて'84年まですべて売切れの状態であり，現在'84～'85年積み以降の新規開発分についての商談が進められている状況にある。 したがって'84～'85年頃までは，最近のような需給が逼迫した状況が基本的には続き，スポット価格及び短期（2～3年）契約ものの価格は，かなりの上昇が見込まれる。更に，これらの価格は長期価格に反映されるものと思われる。 欧州・東南アジアとの買入れ競合は価格上昇圧力となる。
(8) 中期見通し '87～'90年	(9) IEAの石油火力禁止の圧力がますます強まり，原子力も計画どおり開発が進まないため，石炭に対する需要は一層強まり，他方で豪州炭以外の中国炭，米国西部炭の開発による供給分散が大きく進まない恐れがあるので，需給の緩和は望めない可能性が強い。たとえば，石炭火力の建設が遅れる場合でも，影響は単なる時期的なズレコミにとどまり，大きな需給緩和要因とはならない。

（出所）：（財）日本エネルギー経済研究所　(25)

Forecasts (Scenarios)

(2) 価格形成要因と前提条件		
	(1) (5) 需給バランス	・'85年まで現在のようなタイトな状態が基本的に続き，需給の緩和は期待できない。
	(2) (6) 原油価格上昇によるインフレの影響	・新規開発ものの生産費・輸送費に反映され，需給バランスからみて，価格転嫁は比較的容易。
	(3) 重油との経済性比較 (7)	・原油価格の上昇により石炭の経済的メリットは継続する。石炭生産者は石炭価格の割安感を抱いており，重油との格差縮少の意図が強く，価格への影響は避けられないが，石炭デメリットを考慮した上で重油に対してカロリー等価の水準にはならない。
(10) ケースⅠ（レファレンス）	(1) (11) 需給バランス	・比較的安定…余剰供給力が期待できる。 ・国・業界ベースでの需要とりまとめなどの開発参加態勢が順調に整備される。 ・コール・チェーン（鉄道・港湾・外航船・受入基地を含む）の整備がスムーズに進行する。
	(2) (12) 生産者・資源所有者のプロフィット・マージン拡大	・供給ソースの分散がうまく行なわれる。 ・生産者間の競争が相当程度期待される。
	(3) (13) 原油価格上昇によるインフレの影響	・価格に転嫁される。 ・コストをかなり反映した水準で価格が決まる。
	(4) (14) 重油との経済性比較	・無視できないが直接の要因にはならない。
(15) ケースⅡ（ミドル）	(1) (16) 需給バランス	・比較的安定するが，過剰生産とならないよう需要を確保した上で，生産量が決められる。 ・需要側の足並みが揃わない。 ・コール・チェーンの整備が比較的小規模にとどまる。
	(2) (17) 生産者・資源所有者のプロフィット・マージン拡大	・オイル・メジャーなどの生産者側が資源支配を背景にしてマージンの拡大を図るが，ＯＰＥＣが石油価格を政治的に決めるような力には遠く及ばない。 ・市場の寡占化が進み，生産者側に有利な状態となるが，価格協定を行なうほどの力は持てない。 ・生産者間の競争は確保される。
	(3) (18) 原油価格上昇によるインフレの影響	・需給の力関係から見て価格転嫁は比較的容易。 ・コスト・ベースよりはかなり高い水準で価格が決まる。
	(4) (19) 重油との経済性比較	・生産者側は重油との格差縮少の意図強く，価格に影響するが，カロリー等価にはならない。
(20) ケースⅢ（ハイ）	(1) (21) 需給バランス	・生産者側は原則として需要側の引取保証を取りつけた上で開発を行ない，余剰供給力はあまり期待できない。 ・石油供給の突発的な中断，ストライキ，コール・チェーンの整備の遅れ，需要と供給のマッチングのズレなどの要因により，一時的な需給タイト現象が繰り返しておこり，価格上昇圧力となる。 ・原子力開発の遅れ，石油依存度低減の必要性から燃料選択の幅が狭まり，需要の価格弾力性はさらに低下する。 ・供給ソースの分散化，需要側の一本化がうまく行なわれずバーゲニング・パワーが発揮できない。
	(2) (22) 生産者・資源所有者のプロフィット・マージン拡大	・総合エネルギー産業を目指すオイル・メジャーなどの生産者側は，豊富な資源支配を背景にかつて石油市場を支配したのと同じように石炭市場の制覇を狙って，マージン拡大の意欲を持っており，石油とのカロリー等価を主張する。 ・生産者カルテルの結成は客観的に見て困難だが，需給の動向によっては暗黙の了解のもとにリーダー企業や政府の行動に追随・同調する動きが起こり，結果的にはカルテル行為を行なったのと同様の成果を収める。
	(3) (23) 原油価格上昇によるインフレの影響	・すべての価格に転嫁されるが，実際の価格はコストベースを図るに上回るものとなる。
	(4) (24) 重油との経済性比較	・石炭デメリットを考慮した上で，重油に対してカロリー等価の水準まで価格が上昇する。

[Key on following page]

Key:

1. Summary
2. Factors comprising prices and assumed conditions
3. Short range outlook (1980-85)
4. Australian coal, including that which is newly exploited, is sold out through 1984, and commercial talks for the new coal to be shipped in 1984-85 are going on now. Thus market conditions will continue to be tight until 1984 or 1985; spot market prices and the short term (2 or 3 years) contract price will go up a good deal. These prices will also be reflected in long term contract prices. Prices will be pushed up by competition from buyers in Europe and Southeast Asia.
5. (1) Supply and Demand Balance--Present tight market conditions will basically continue until 1985; there is no hope for easing.
6. (2) Inflationary Effects of Crude Oil Price Rises--The effects of inflation will be reflected in the costs of producing and transporting newly exploited coal, and will be easily passed on because of tight market conditions.
7. (3) Economic Advantages in Comparison to Fuel Oil--The economic merits of coal will continue as crude oil prices increase. Coal producers are aware of the relatively low price of coal and wish to reduce the price spread between coal and fuel, so an impact on coal prices is inevitable. But because of the inconvenience of using coal, it will not reach the calorie-equivalent price of fuel oil.
8. Medium range outlook (1987-90)
9. IEA pressure for prohibition of oil fired equipment will grow increasingly strong and--because development of atomic energy will not proceed as planned--market conditions for coal will become tighter yet. Since it is feared there will not be much progress in diversifying supplies to include coal from the PRC and the western U.S., there is little hope for improvement in the balance of supply and demand. If, for example, the construction of coal fired facilities is delayed, impact on demand will also be delayed, but there will be no real easing of demand.
10. Case I (reference)
11. (1) Supply-demand balance--Relatively stable; excess supply can be anticipated. --Participation in development will be coordinated on a countrywide or industrywide basis. --Provision of coal chain facilities (including railroads, ports, ships and receiving bases) will proceed smoothly.
12. (2) Profit margin expansion for producers and resource owners--Sources of supply will be skillfully diversified. —A great deal of competition among producers can be expected.
13. (3) Inflationary effects of crude oil price rises--Costs will be passed through. --Prices will be set at levels which reflect costs to a great extent.
14. (4) Economic advantage in comparison to fuel oil--This cannot be ignored, but it will not be a direct factor.
15. Case II (middle)
16. (1) Supply-demand balance--Relatively stable, but production levels will be set on the basis of demand so there will be no excess production. --Consumers will not be coordinated. —Coal chain facilities will stay small scale.

17. (2) Profit margin expansion for producers and resource owners--Producers including the oil majors will control resources and will try to expand margins, but will fall far short of OPEC's power to set oil prices for political reasons. --Market oligolopy will develop and circumstances will favor the producers, but they will lack the strength to carry out price agreements. --There will be competition among producers.
18. (3) Inflationary effects of crude oil price rises--Market conditions will make cost pass-through relatively easy. --Prices will be set at a highly high level on a cost basis.
19. (4) Economic advantage in comparison to fuel oil--Prices will be affected by the desire of producers to reduce the price differential between coal and oil, but coal will not reach the calorie-equivalent level of fuel oil.
20. Case III (high)
21. (1) Supply-demand balance--Producers will develop coal only on securing transactions with users, and little excess production capacity can be expected. --Temporary market tightness and upward pressure on prices may result from such factors as a sudden cutoff of oil supplies, strikes, delay in setting up the coal chain, and mismatching of supply and demand. --Delayed development of atomic energy and the necessity of reducing dependence on oil will narrow the selection of fuels and reduce price elasticity of demand. --Consumers will be unable to develop bargaining power because they have not diversified sources of supply and are not unified.
22. (2) Profit margin expansion for producers and resource owners--Producers, including oil majors who seek to form a comprehensive energy industry, will control abundant resources and will attempt to gain the same dominance of the coal market as they hold in the oil market; in order to expand profit margins they will call for calorie equivalence of coal and oil prices. --Formation of a producers' cartel will not be objectively evident, but market conditions will give rise to a tendency to tacitly accept and follow the actions of leading industries and governments; the result will be effectively the same as if a cartel had been formed.
23. (3) Inflationary effects of crude oil price rises--All costs will be passed through, but actual prices will be set above the cost basis.
24. (4) Economic advantage in comparison to fuel oil--With consideration given to the inconvenience of using coal, coal prices will be set at the calorie-equivalent level of fuel oil.
25. Source: Japan Energy Economics Institute

Although it is expected that market conditions for coal will be tight and there is little chance of a buyer's market, it is practical and proper to think that coal prices will not rise sharply and consistently to the calorie-equivalent price of fuel oil. The most important task for the concerned parties in the coal importing countries will be to devise the necessary countermeasures so that will not happen.

9601
CSO: 8129/1809

OIL INDUSTRY RELIEF MEASURES APPROVED, SELLING PRICES NOT SET

Tokyo JAPAN PETROLEUM, ENERGY WEEKLY in English Vol 16, No 34, 24 Aug 81 pp 1-3

[Text]

As reported last week, the institution of the controversial government-set standard selling prices, originally scheduled to be decided on July 27 but put off to August 20 in the face of strong opposition from the oil consumer sector, was once again postponed to a later date, probably until September 16, when the next meeting of the Petroleum Council, an advisory body to the Minister of International Trade and Industry on major oil industry matters, is scheduled to be held.

At the August 20 meeting of the Petroleum Council, it was only decided that both the government and industry should take preparatory steps so that Article 15 of the Petroleum Enterprise Law can be invoked at any moment deemed necessary to institute the standard selling prices. The consensus of opinion among the council members was that the final decision as to when and how the standard prices are enforced should be made with extreme care, taking into account:

- the effectiveness of the refinery production cutback started in July under administrative guidance (JPEW, June 29 - P.1),
- the degree of success in industry's efforts toward increasing product prices with effect from early August (JPEW, August 3 - P.7),
- the somewhat erratic movement of the yen exchange rate versus the US dollar in recent weeks (JPEW, August 12 - P.12; August 17 - p.2), and
- the OPEC nations' move on new oil prices and production levels.

Meanwhile, the Petroleum Council at this meeting on August 20, heard an interim report prepared by the council's subcommittee and approved the subcommittee's other recommendations on a number of measures to be taken, both short range and long range, to rescue the deficit-stricken petroleum refining and marketing/primary distribution industry. The subcommittee was organized immediately after the Petroleum Council meeting on July 27 as a task force to work out ways and means to solve the problems now facing the Japanese oil industry. Since its inauguration, the subcommittee has had a series of meeting on July 29, August 3, 4, 12, 14 and 18 to hear the opinions of various organizations including major oil-consuming industries (such as the petrochemical, iron and steel, electric utilities, city gas, fisheries, truck transportation industries).

The subcommittee's recommendations submitted to the August 20 meeting of the council did not strike a fresh note but include, among others (JPEW, August 3 - P.1):

A. Emergency and Short-Range Measures

- **A downward revision of the Petroleum Supply Plan for fiscal 1980 (see separate article in this issue).**
- **Purchase by the governmental Japan National Oil Corp. of surplus crude oil from refiners.**
- **Requesting cooperation from the electric utility industry to shift from crude oil burning to fuel oil C burning.**
- **Requesting cooperation from city banks to provide refiners with the funds necessary to finance cost increases arising from increased stockpilig of oil and reduced rate of refinery operation.**
- **Investigation as to advisability of instituting standard selling prices on LPG to rescue the likewise deficit-ridden LPG industry.**

B. Medium- and Long-Range Measures

- **Improvement of the oil industry structure, which in its present state is susceptible to excessive competition among companies, by:**
    - scrapping down of surplus and inefficient refining facilities so as to lessen the wide gap currently existing between large production capacities and marketing/distribution capacities,
    - consolidation of the existing 13 marketing/primary distribution companies into a smaller number of financially healthier companies, or at least into fewer groups, and
    - joint operation, intra-group or inter-group, in areas such as crude oil purchase and plant & equipment investment.
- Assurance of adequate supply of middle distillate fuels (in the face of the crude oil mix to be imported into Japan in the future becoming increasingly heavier) by encouraging the introduction of residual oil cracking and/or alternative energy sources.

- Realization of normal product prices through market-oriented pricing mechanism so that the sluggish demand for fuel oil C (triggered by the industrial sector's stepped-up energy conservation and alternative energy development), the continued firm demand for gasoline and middle distillate fuels, etc. can be duly reflected on the prices of these products.

- Studies on measures to counter the current financial risks resulting from foreign exchange rate fluctuations in view of the fact that the impact of such fluctuations is being focused on the refining industry with the oil import bill now accounting for nearly one half of the nation's total imports. Because of a number of technical problems involved in such studies, a specialist working group will be organized within the subcommittee. The working group is expected to finalize its studies by the end of October.

CSO: 4120/328

PANEL URGES DIVERSIFYING OF FOREIGN COAL IMPORT SOURCES

Tokyo JAPAN PETROLEUM, ENERGY WEEKLY in English Vol 16, No 35, 31 Aug 81 pp 1-6, 10

[Text]

Following a seven-month investigation into the problems involving in securing long-term coal supply stability from overseas sources, the Overseas Coal Investigative Committee* (headed by Masao Sakisaka, board chairman of the Institute of Energy Economics), a privately organized advisory panel to Director-General Kunio Komatsu of the Natural Resources & Energy Agency of the Ministry of International Trade and Industry (MITI), presented its interim recommendations on August 26, calling for, among others, the diversification of coal import sources from Australia, on which Japan is heavily dependent, to other areas such as the western U.S., expanded utilization of lower grades of coal such as brown coal, as well as enhanced international cooperation between coal producing and importing nations.

The report is based on the assumption that demand for coal resources from foreign sources will continue to grow through this decade. According to the latest available "Alternative Energy Supply Targets for 1990," as adopted at a cabinet meeting held on November 28, 1980, and published on the same date by MITI (JPEW, December 1, 1980 - PP.1/6), Japan's coal import in fiscal 1990 is forecast to be 143.5 milion tons** (53.5 million tons of steam coal and 90.0 million tons of coking coal) in contrast to actual imports in fiscal 1980 (ended March 31, 1981) of 73.0 million tons (7.2 million tons of steam coal, 64.7 million tons of coking coal and 1.1 million tons of anthracite), representing an increase of nearly 100 percent over the next ten-year period.

On the other hand, certain problems involved in securing this required import are envisioned: namely, the inability of the supplier nations to keep pace in terms of their coal shipment facilities, the sharply increased

---

(*) Composed of representatives of coal suppliers, coal-consuming industries, trading houses, and banks.

(**) In addition to this import, indigenous coal supply is estimated to total 20 million tons steam coal and coking coal on a 50:50 basis.

coal prices triggered by ever growing demand (especially in the case of Australian coal), etc.

The contents of the Committee's report are summarized as follows:

A. Four Points of Major Consideration

(1) The "coal chain" must be viewed from an overall angle, with measures taken to assure the smooth operation of each phase of the entire chain system.

(2) In view of long lead times required for establishment of such a system, adequate planning should be undertaken and hasty decisions avoided at all cost.

(3) Planning should be carried out with due consideration given both to achieving supply security (to minimize the impact from suspension in supplies by strikes in the supplier nations and the like) as well as to securing the economic feasibility of projects involved.

(4) In order to make long-term planning successful, international cooperation of a bilateral and multi-national scale must transcend the immediate issues of coal procurement and extend into areas of mutual interest.

B. Directions and Problems Related to Supply Stability

(1) Expansion of supply capabilities

The world demand for coal is forecast to double over the next ten years, thereby requiring efforts to create the supply structure necessary to meet this demand. Japan's demand is expected to be met through fiscal 1985; however, by 1990, supply is anticipated to fall short of demand, particularly in the area of steam coal. In this connection, major oil companies' active entry in recent years in coal resources development is expected to have a considerable influence on the world coal trade and their future moves deserve close attention.

- Acceleration of mine development

  Expansive projects aimed at mine development must be given thorough consideration, including capital participation where deemed advantageous to the securing of longer-term coal supplies.

- Expansion of loading capability

  Since grave apprehension is felt that the coal-producing nations' infrastructure relating to coal transport and loading facilities will become aggravated over the coming years, Japan must take cooperative steps with the nations involved to build the facilities needed.

(2) Diversification of supply sources

- Regional diversification

At present Japan relies on Australia for approximately 60 percent of its steam coal imports, and nearly 40 percent of its coking coal imports. In view of the potential danger inherent to this over-dependence on a single country, say, in the cases of mine strike and accidents related to coal mines, utmost efforts should be taken to achieve greater diversification in coal supplier nations.

i) Western U. S.

Recently, attention has been focused on vast proven coal reserves located in the western U. S., estimated to be about one half of the U. S.'s total reserves. Japan should cooperate with the U. S. in aiding the development of this vital area, and in providing assistance to improve the currently inadequate transport and port facilities as well as those needed in the future. Japanese specialists should be called upon to cooperate in the selection of specific mining sites and the mapping of transport routes in order to improve the infrastructure expeditiously.

ii) Expansion of current supply sources

In view of overall superior position within the coal supply picture, Australia should continue to be looked upon as a highly important coal supply source. China, Canada and other existing suppliers should also be fully explored as to their potential expansion capabilities.

- Diversification of coal grades

At present, lower-grade coal is virtually excluded from consideration on world markets, yet their proven reserves are said to be as high as 30 percent of the total known world coal resources. For this reason, technologies should be pursued which will allow greater utilization of these available but yet largely untapped energy sources.

(3) Improvement of domestic infrastructure for importing foreign coal

To meet the anticipated growth in coal import supplies, the availability of the required number of oceangoing vessels and long-term chartering contracts must be given full attention. Consideration must also be paid to the need for "coal centers" which serve as import relay stations. In addition, necessary tonnage of coastal barges must be secured for secondary shipping from coal centers to individual coal-consuming areas.

(4) Improvement and diversification of coal utilization technologies

In order to meet Japan's coal needs, the following coal technologies are seen to be of urgent importance and should become the focus of R&D efforts:

- In the short term: technologies relating to flue gas treatment and ash disposal to cope with increased coal burning to be promoted to supplement the current crude oil burning.
- In the long range: technologies relating to coal-oil mix fuel, fluidized bed combustion, utilization of lower-grade coal, liquefaction and gasification of coal, etc.
- Attention should also be given to the development of improved production technologies to be applied in the respective coal-production nations.

C. Governmental/Private Response

(1) Cooperation from the private sector

To create a rational and stable supply system in tune with the coal market needs, private cooperation should be sought relative to the following points:

- Owing to the fact that the coal mine development is implemented only when a definite demand has been established for the ultimate coal supply, long-term contracts within the private sector should be sought which would ensure such demand.
- Cooperation necessary for building overseas infrastructures

  Full cooperation as needed must be given by Japanese coal users and demand industries for the development of the infrastructure in the coal-supplying nations.
- Cooperation for a rational market configuration

  Sharp price rises for foreign coal serve to impede trade expansion between the producing and importing nations, as well as the attainment of lower oil dependence as internationally demanded. A rationalization of the importing market should therefore be carried out to reach a purchasing structure offering greater order for improved security.
- Cooperation for greater international understanding

  In order for Japan to play a more meaningful role in related issues of world concern, Japanese parties concerned should reach mutual agreement on philosophies and measures which can then be presented at international forums.

(2) Government policies

While private cooperation is naturally vital to the attainment of sound resolutions to coal-related issues, the role the government must play must also be stressed in areas such as where high risks are involved, where infrastructures must be improved to facilitate private coal industry activities, and where international adjustments will be necessary. Steps should be taken in the following directions:

- Enhanced information networks

  The government should improve its ability to gather, analyze and put to good use a broad range of knowledge relating to domestic and overseas energy issues, international politics, economies, etc.

- Enhanced international cooperation

  In addition to actively seeking improved international cooperation both on a binational and multi-national level, the government should also do its utmost to offer aid and cooperation to developing countries possessing energy resources.

- Government policies relating to the infrastructures

  . Promotion of infrastructural development in coal-producing nations.
  . Construction of coal centers based on low-interest funding.
  . Assistance in promoting coal utilization technologies and development.
  . Promotion of mine exploration and development activities.

Shown on pages 6 and 10 are the related tables.

Table 1 World Coal Reserves, Production and Trade (1979)

(Unit: million metric tons)

Country	Reserves*	Production	Exports	Imports
Australia	36,302	83	40.3	-
Canada	4,368	28	13.9	17.6
China	99,000	663	N.A.**	-
France	574	19	0.5	27.4
India	13,134	103	N.A.	N.A.
Italy	15	0	-	13.9
Japan	1,056	18	-	58.6
Poland	30,600	201	41.3	0.9
South Africa	25,290	103	23.4	-
UK	45,000	121	2.3	4.4
USA	190,890	704	59.9	1.9
USSR	165,470	495	23.9	9.5
West Germany	34,536	93	15.6	7.8
Others	41,255	148	7.9	87.0
	687,490	2,779	229.0	229.0

(*) Include brown coal. (**) China's export to Japan was 1.38 million tons.

Source: Reserves -- "The 11th World Energy Conference (1980)"; Production -- "Coal International" (1980); Trade -- "World Coal" (1980)

Table 2 Japan's Imports of Overseas Coal by Source

(1,000 metric tons)	Fiscal 1974	Fiscal 1975	Fiscal 1976	Fiscal 1977	Fiscal 1978	Fiscal 1979	Fiscal 1980
Steam Coal							
Australia	70	169	248	528	727	1,282	4,517
Canada	-	-	-	-	12	-	600
China	69	135	125	168	172	236	742
South Africa	-	-	15	6	20	29	487
USA	12	48	-	-	28	-	639
USSR	87	31	211	237	123	129	249
Others	-	-	4	-	-	1	-
	238	383	603	939	1,082	1,677	7,234
Coking Coal							
Australia	23,210	22,720	26,238	26,013	24,159	26,981	26,493
Canada	9,429	11,434	10,095	10,611	10,917	9,776	11,214
China	4	4	16	3	427	847	955
Poland	1,283	1,015	986	740	429	489	387
South Africa	133	69	1,210	2,398	2,298	2,453	2,861
USA	25,552	21,412	17,088	13,305	9,946	13,955	20,671
USSR	3,058	3,184	2,964	2,863	2,246	1,926	2,003
Others	264	1,125	592	347	398	262	114
	62,933	60,963	59,189	56,280	50,820	56,689	64,698
Anthracite	1,456	1,040	1,094	1,441	1,001	1,071	1,140
Total	64,627	62,386	60,886	58,660	52,903	59,437	73,072

(Source: Ministry of Finance)

Table 3 **Japan's Steam Coal Import Prices (CIF Basis)**

(US$/ton)	Fiscal 1974	Fiscal 1975	Fiscal 1976	Fiscal 1977	Fiscal 1978	Fiscal 1979	Fiscal 1980
Australia	39.8	39.1	38.5	37.0	39.5	44.0	56.8
Canada	-	-	-	-	31.4	-	53.8
China	34.1	32.0	34.0	38.3	37.1	37.7	49.5
South Africa	-	-	29.7	32.7	35.9	41.6	42.5
USA	44.3	40.4	-	-	42.7	-	66.3
USSR	26.9	28.6	28.1	28.6	29.7	35.0	46.0
Others	-	-	32.5	-	-	-	N.A.
Average	33.6	35.8	33.7	35.1	37.9	42.4	56.7

(Source: Ministry of Finance)

CSO: 4120/329

TDA COMMISSIONS IHI TO REPAIR A300 ENGINES

Tokyo JPE AVIATION REPORT-WEEKLY in English No 536, 2 Sep 81 p 2

[Text]

Toa Domestic Airlines (TDA) has appointed Ishikawajima-Harima Heavy Industries Co. (IHI) for overhaul of its General Electric CF6-50 engines for Airbus Industrie A300 transports. IHI has already invested ¥1,000 million in equipment for overhaul of CF6 engines for Boeing 747s of All Nippon Airways, which will be used for the A300 engines as well.

TDA has contracted with Airbus Industrie to purchase nine A300s, of which it has already acquired three. The fourth A300 will be delivered to it in November and the fifth and sixth aircraft in 1982.

The A300 is equipped with two CF6-50 engines. The overhaul of the 3,960-kilogram engine is estimated to cost more than ¥30 million per unit on every occasion.

CSO: 4120/326

ADVISORY COUNCIL SUPPORT PRIVATE TAKEOVER OF NAMCO

Tokyo JPE AVIATION REPORT-WEEKLY in English No 536, 2 Sep 81 pp 2-4

[Text]

The Aircraft and Machinery Industry Council, an advisory body to the Ministry of International Trade and Industry (MITI), has recommended the private sector's takeover of the semigovernmental Nihon Aeroplane Mfg. Co.'s (NAMCO) business and the establishment of new corporations for the Japan-Boeing-Italy Boeing 767 program and the Rolls-Royce/Japan RJ500 aircraft engine program.

The recommendation, prepared by the Policy Subcommittee of the council's Aircraft Industry Committee, was approved at the committee's meeting in the middle of August.

It gave support behind the government's decision to disband NAMCO, with the private sector taking over its current business of product support for YS-11 operators, by the end of FY 1982 or March 1983. But it noted that due consideration should be given to the YS-11 product support and to the future of the 120 NAMCO employees after the takeover.

Informed sources said Mitsubishi Heavy Industries Ltd. (MHI) alone may take over the NAMCO business, although the private sector has so far considered a joint company of MHI, Kawasaki Heavy Industries Ltd. (KHI) and Fuji Heavy Industries Ltd. (FHI) for the takeover. The committee prefers, however, that a single company succeed to the NAMCO business, they added.

NAMCO was founded in 1959 with 54 percent of its capital raised by the government to develop, produce and market the YS-11, Japan's first self-developed commercial aircraft. It has sold 180 aircraft at home and abroad. But it has been faced with a sharp increase in production cost, which has brought about a cumulative business loss bigger than its capital. Since discontinuing of YS-11 production in FY 1973, NAMCO has been supplying YS-11 spare parts and technical service for YS-11 operators and recalling deferred payment credits.

But the government decided late last year to disband NAMCO, as part of its administrative reform efforts, requesting the advisory council to study the advisability of the decision. The YS-11 product support business, to be taken over by the private sector, is still important because 160 YS-11s are still flying in the world.

On development and production of aircraft and engines, the recommendation confirmed MITI's basic policy of supporting only the development stages of projects involving great risks. It said the private sector should be wholly responsible for production and marketing.

The basic policy is reflected in the proposal for the establishment of a new corporation to take over Civil Transport Development Corp.'s (CTDC) B-767 program contract with Boeing with completion of the B-767 program's development phase next year. CTDC has handled the development phase with government loans, which will not be available for production and marketing phases. The new corporation will be founded jointly by MHI, KHI and FHI. The B-767 program will shift to the production phase when a type certificate is given to the new aircraft in the summer of 1982.

On the development of the Y-XX 150-seat-class transport, the recommendation said the government and the industry should consider CTDC or a new incorporated foundation to undertake the development with government loans. At present, CTDC has a Y-XX preparation office to handle basic design work under the FY 1981 budget, although foreign partners in the program have yet to be selected. But MITI has not yet decided whether CTDC should continue to take charge of the Y-XX development, considering that CTDC, which has handled the B-767 program with Boeing, would not be appropriate as a Y-XX promoter if foreign aircraft manufacturers other than Boeing are selected as partners.

Complying with the recommendation, MITI and the aircraft industry will study an appropriate Y-XX promoter while going ahead with work on selection of partners. If a new corporation is founded for the Y-XX program, a precedent of setting up a new corporation for each government-subsidized aircraft development project would be established.

For engine projects, the recommendation said new organizations should be established separately from aircraft programs. This policy would be favorable to engine manufacturers. If the same organization undertakes aircraft and engine development, it would be difficult for it to sell engines to competitive aircraft manufacturers.

In this respect, the recommendation said a new nonprofit organization should be founded for the Japan/Rolls-Royce RJ500 (XJB) program before full-scale development starts. At present, the Engineering Research Association for Aerojet Engines (ERAAE), which undertakes aircraft engine programs for MITI's Agency of Industrial Science and Technology, has an XJB office through which Ishikawajima-Harima Heavy Industries Co., MHI and KHI have set up a joint venture with the British partner in April 1980 to launch work on the RJ500 engine. The new Japanese organization for the RJ500 program will be formed by the three engine manufacturers.

The biggest problem with the RJ500 program is how to minimize financial risks in the production phase. But the recommendation supported MITI's policy of not subsidizing the production phase, calling on the three engine manufacturers to make even greater efforts to solve problems themselves. The RJ500 is planned to enter service in 1986 to power next-generation 150-seater airliners.

CSO: 4120/326

SCIENCE AND TECHNOLOGY

JDA TO NAME MT-X PRIME CONTRACTOR

Tokyo JPE AVIATION REPORT-WEEKLY in English No 536, 2 Sep 81 pp 8-9

[Text]

The Japanese Defense Agency (JDA) is expected to make a final decision on a prime contractor for the development and production of the MT-X new intermediate trainer by Sept. 15.

The JDA's Technical R&D Institute (TR&DI) is now coordinating views with the Air Self-Defense Force as the MT-X operator and JDA internal bureaus after evaluation of MT-X proposals by MHI, KHI and FHI vying for the ¥300,000 million prime contract. It may select the prime contractor tentatively by the end of August before the JDA's final decision.

Informed sources said KHI may be awarded the prime contract on the condition that the other two would take part in the program as subcontractors. In actuality, the three contenders would jointly undertake the program, they added.

The prime and subordinate contractors, if named in September, will start the MT-X program with work on a basic airframe design in October under the FY 1981 budget's ¥1,955 million for the work.

According to the TR&DI's plan, work on a detailed design will be funded in FY 1982 and fabrication of test aircraft in FY 1983. Funding is estimated at ¥5,000 million for FY 1982 and more than ¥30,000 million for FY 1983. Thus, MT-X development funds would total ¥37,000 million.

In the development phase ending in FY 1987, the TR&DI plans to fabricate six prototype aircraft -- four for flight tests and two for fatigue tests. The first prototype aircraft is scheduled to make its first flight in the summer of 1985 before delivery to the TR&DI by the end of the year. The other three flight test aircraft will be delivered by March 1986. They will undergo technical tests in FY 1986 and application tests in FY 1987.

The MT-X will replace the FHI-developed T-1 and the Lockheed T-33, produced by KHI under license. MT-X procurement is expected to total about 200 aircraft.

CSO: 4120/316

JET ENGINE FOR DRONE TO BE DEVELOPED

Tokyo JPE AVIATION REPORT-WEEKLY in English No 536 2 Sep 81 pp 9-10

[Text]

The TR&DI of the Japanese Defense Agency has decided to start the development of a jet engine in FY 1982 for a new remotely piloted vehicle as a target drone, although it had intended to launch the development of both the engine and the airframe in the same year.

It has introduced the Firebee target drone through domestic production for missile firing training. But the Firebee's J-69 engine has been imported from Teledyne. As to the future target drone, the TR&DI intends to develop both the engine and the airframe on its own.

Although the high-cost Firebee has been used repeatedly, the TR&DI will design the new drone as a disposable aircraft whose price will be one third of the Firebee price. Therefore, the engine cost would have to be lowered sharply.

The TR&DI has already been developing a small jet engine jointly with MHI since FY 1980 for a new ground-launched antiship missile based on the ASM-1 air-launched antiship missile using a solid fuel rocket. MHI has completed prototypes for tests. The engine for the new drone is required to be less costly than the missile engine.

KHI has submitted a proposal on the development of the drone engine to the TR&DI, competing with MHI which has experienced the missile engine development.

CSO: 4120/326

SJAC SPACE INDUSTRY REPORT FOR FY 1979

Tokyo JPE AVIATION REPORT-WEEKLY in English No 536, 2 Sep 81 p 10

[Text]

The Society of Japanese Aerospace Companies (SJAC) revealed toward the end of August its report on Japanese space industry for FY 1979. Space related major Japanese manufacturers number 70 and the total turnover for that fiscal year amounted to ¥103,200 million. Of the total sum, 21.4 percent amounting to ¥22,100 million was for export mainly related with ground equipment such as data transmitting/receiving and processing systems. Import amounted to ¥25,300 million.

Of the ¥103,200 million, ¥34,000 million is related with the rocket, ¥32,800 million with the ground equipment and ¥16,000 million with the artificial satellite. About 70 percent of the domestic business which accounted for 78.6 percent of the total sum is related with the work ordered by the National Space Development Agency of Japan.

Of the 70 manufacturers, 32 are in the electronic and electric business, seven are precision equipment makers, five chemical firms and three machinery makers.

Personnel in the space manufacturing industry number approximately 4,700. Forty-five percent of these people are research and development engineers.

CSO: 4120/326

MITI MOVES TOWARD REORGANIZATION OF OIL INDUSTRY

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16, No 36, 7 Sep 81 pp 1-3

[Text]

The Ministry of International Trade and Industry (MITI) is taking a big step forward in the controversial reorganization of the downstream of the Japanese oil industry, with special emphasis placed on consolidating wholly Japanese-owned refining and marketing/primary distribution companies into three or so groups. According to an unofficial MITI plan, Idemitsu Kosan, Kyodo Oil, and Maruzen Oil/Daikyo Oil will constitute the nucleus companies in the reorganization of the Japanese independent oil companies.

As the first of a series of actions to be taken by MITI to implement this objective, the long-term government bank loans at low interest rate in the form of Japan Development Bank loans, which so far had been limited to the Kyodo Oil group companies, will also be extended to other wholly Japanese-owned companies to help them finance their facility expansion.

A total amount of ¥12.0 billion ($52 million) JDB loans was appropriated in the budget for fiscal 1981 (ending March 1982) to be extended to the Kyodo Oil group companies. MITI is now planning to request the Finance Ministry to approve JDB loans totaling ¥15.5 billion for fiscal 1982, which will be extended to all of the Japanese independents to provide an incentive for stepping up the reorganization.

Kyodo Oil was established on August 10, 1965, under administrative guidance of MITI, integrating the marketing divisions of then small-sized independents — Nippon Mining, Asia Oil and Toa Oil. Later, Fuji Oil and Kashima Oil joined the Kyodo group in 1966 and 1967, respectively. In 1970 and 1973, Asia Kyoseki and Toa Kyoseki were established by Asia Oil and Kyodo Oil and by Toa Oil and Kyodo Oil, respectively, Kyodo Oil holding a one-third equity interest of each.

However, Toa Oil was separated from the Kyodo Oil group, when Showa Oil acquired 25 percent out of 38.85 percent of Toa Oil's equity capital owned by C. Itoh & Co. effective December 25, 1979, with the remaining 13.85 percent still owned by C. Itoh. Likewise, Asia Oil left the Kyodo group in February 1981, when Daikyo Oil acquired a 48.7 percent equity share of Asia Oil.

Among the reasons for MITI's move referred to above are:

- Kyodo Oil group companies have already grown up, with their shares of the Japanese market and refining capacity now reaching 13 and 15 percent, respectively, thereby diminishing the reason for the government giving preferential treatment to the Kyodo Oil group companies alone.
- Reorganization of the oil industry, including grouping of oil companies, should be an essential prerequisite to:
    - . avoidance of excessive competition among companies, and
    - . scrapping of surplus refining capacities which led to the over-supply of the products.

  which together are responsible for bringing about the present-day market depression.

Meanwhile, the Petroleum Council's subcommittee is expected to finalize ways and means to improve the oil industry structure by the end of this year (JPEW, August 24 - p.1).

Shown below is a breakdown of the existing 36 refining and marketing/primary distribution companies competing with each other: (For company-by-company details, see the table on the next page.)

	Wholly Foreign-Owned, or Affiliated with Foreign Oil Companies	Wholly Japanese-Owned Oil Companies
A. Refining & marketing/primary distribution companies:		
	General Sekiyu	Daikyo Oil
	Mitsubishi Oil	Idemitsu Kosan
	Nippon Oil	Kyushu Oil
	Showa Oil	Maruzen Oil
B. Marketing/primary distribution companies:		
	Esso Standard Sekiyu	Kyodo Oil
	Kygnus Sekiyu	
	Mobil Sekiyu	
	Shell Sekiyu	
C. Refining companies:		
	Koa Oil	Asia Oil

PRESENT STATUS OF 36 JAPANESE REFINING & MARKETING/PRIMARY DISTRIBUTION COMPANIES

	Capitalization (¥ million) (as of Mar.31, 1981)	Refining Capacity (as of Dec.31, 1980)		Sales Volume in Fiscal 1979	
		BPSD	% Share	1,000 B/D	% Share
A. Oil Companies, Wholly Owned by Foreign Capital or Affiliated with Foreign Oil Companies					
a. 100% owned by foreign capital:					
. Esso Standard Sekiyu	20,000	-	-	202.1	4.88
. Mobil Sekiyu	11,000	-	-	247.6	5.97
. Shell Sekiyu	6,904	-	-	288.4	6.96
	37,904	-	-	738.1	17.81
b. 50% owned by foreign capital:					
. Koa Oil (Caltex)	6,000	229,000	3.86	11.9	0.29
. Kyokuto (Mobil)	7,000	150,000	2.53	-	-
. Mitsubishi (Getty)	15,000	375,000	6.31	319.9	7.72
. Nippon Petroleum Refining (Caltex)	10,000	580,000	9.76	-	-
. Showa Oil (Shell)	6,750	192,000	3.23	182.2	4.39
. Toa Nenryo (equally by Exxon & Mobil)	22,264	430,500	7.25	-	-
	67,014	1,956,500	32.94	514.0	12.40
c. Less than 50% owned by foreign capital:					
. General Sekiyu (49% owned by Exxon)	4,699	175,000	2.95	159.6	3.85
. Seibu Oil (20% by Shell)	8,000	190,000	3.20	23.1	0.56
. Showa Yokkaichi (25% by Shell)	4,000	310,000	5.22	-	-
	16,699	675,000	11.37	182.7	4.41
d. Either indirectly owned by or teamed up with foreign oil companies:					
. Kygnus Sekiyu	2,000	-	-	48.5	1.17
. Nansei Sekiyu	7,625	80,000	1.35	-	-
. Nichimo Sekiyu Seisei	1,000	100,000	1.68	-	-
. Nihonkai Oil	4,000	60,000	1.01	-	-
. Nippon Oil	33,515	26,000	0.44	735.6	17.74
. Toa Oil	4,961	100,000	1.68	-	-
. Tohoku Oil	7,500	100,000	1.58	-	-
	60,601	466,000	7.84	784.1	18.91
Subtotal	182,218	3,097,500	52.15	2,218.9	53.53
B. Wholly Japanese-Owned Oil Companies					
. Asia Kyoseki	9,600	150,000	2.53	-	-
. Asia Oil	7,507	125,000	2.10	1.4	0.03
. Chita Oil	6,000	100,000	1.68	2.4	0.06
. Daikyo Oil	6,737	215,000	3.62	217.6	5.25
. Fuji Kosan	3,989	77,600	1.31	45.0	1.09
. Fuji Oil	10,000	210,000	3.54	31.2	0.75
. Idemitsu Kosan	1,000	760,000	12.79	605.9	14.62
. Kashima Oil	20,000	180,000	3.03	-	-
. Kyodo Oil	18,000	-	-	533.4	12.87
. Kyushu Oil	6,300	170,000	2.86	84.7	2.04
. Maruzen Oil	20,469	392,500	6.61	332.8	8.03
. Nippon Mining	24,600	249,350	4.20	1.9	0.04
. Nippon Seiro	1,120	-	-	2.0	0.05
. Okinawa Sekiyu Seisei	1,830	100,000	1.68	-	-
. Taiyo Oil	400	69,000	1.16	46.6	1.12
. Teiseki Topping	25	4,410	0.07	-	-
. Toho Oil	1,500	40,000	0.67	21.6	0.52
Subtotal	139,077	2,842,860	47.85	1,926.5	46.47
INDUSTRY TOTAL	321,295	5,940,360	100.00	4,145.4	100.00

CSO: 4120/2

MITI LIKELY TO SUPPORT MITSUI PULLOUT FROM IJPC

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16, No 36, 7 Sep 81 p 4

[Text]

International Trade and Industry Minister Rokusuke Tanaka revealed at a September 1 press conference that the Ministry was likely to respect the decision of the Mitsui Group to withdraw from the joint-venture Iran-Japan Petrochemical Co. (IJPC), in the event that a decision in this direction is made by Mitsui. Speculation is rife that the Mitsui Group is contemplating pulling out of the seemingly hopeless project -- construction of which was begun in Bandar Khomeini in southern Iran in 1973 and which is presently in a state of suspension after being 85 percent completed -- in view of the worsening political instability in Iran following the violent deaths of Iranian President Mohammad Ali Rajai and Prime Minister Mohammad Javad Bahonar on August 30.

Mitsui has been contemplating withdrawal from the joint project ever since the outbreak of political unrest in Iran in 1979. The situation was further aggravated by the eruption of the Iran-Iraq War, which resulted in heavy damages to the petrochemical complex. Owing to the continuing disruptions and damages inflicted, the cost of the project has proceeded to spiral, far exceeding original estimations.

By the time immediately preceding the Iran-Iraq War, an estimated total capital investment for the whole project had reached ¥730 billion ($3.2 billion), sharply inflated from the previous estimate of ¥550 billion. The ¥730 billion capital investment was to be shared by Japan (¥430 billion, including ¥20 billion committed by the governmental Overseas Economic Cooperation Fund) and Iran (¥300 billion) (JPEW, November 3, 1980 - p.9). As of April 1981, Japanese private funds for the project were suspended, despite Iranian requests for continued assistance (JPEW, April 27 - p.12).

In addition to the escalation in internal tensions in Iran, other factors are seen to be influencing Mitsui's reluctance to continue participation. On the one hand, as Japanese consumer demand for petroleum has continued to decline the immediate need for Iranian oil has attenuated.

Furthermore, as of February 1982 repayment of capital principal is scheduled to begin. Both Mitsui and MITI are therefore pressed to come to a decision on the project as expeditiously as possible.

At present, Mitsui is awaiting the Iranian response to its capital funding proposal for completing construction at the complex. To date, however, no follow-up action has been taken by Iran, and a promised Iranian delegation to Japan has yet to materialize. The possibility is thus seen to be growing that Mitsui will take this Iranian attitude as further reason to pull out of the project.

Preparing for such an eventuality, MITI Minister Tanaka announced that, in the event of a Mitsui decision to withdraw from IJPC, MITI would give full consideration to the award of export insurance, the amount of which is estimated to be in excess of ¥100 billion ($435 million). This readiness on MITI's part is widely interpreted as a sign of the Ministry's approval of Mitsui's withdrawal from the project itself, and also as an indication of the Japanese government's withdrawal as well.

CSO: 4120/2

SCIENCE AND TECHNOLOGY

FIRMS RATE HAZARDOUS COUNTRIES FOR INVESTMENT PURPOSES

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16, No 36, 7 Sep 81 p 5

[Text]

The Nihon Keizai Shimbun recently published a survey of 100 leading Japanese companies in which each respondent was asked to evaluate 76 given nations in terms of risks involved when engaging in overseas investments and major trade contracts. As in a similar survey conducted in 1980, the United States came out on top as the least risky nation with which to do business, with a rating of 8.99 out of a possible 10. Nations posing the greatest risks were Afghanistan, Iran, Lebanon and Ethiopia.

Three main factors were taken into consideration in making these evaluations: stability of government, capability to service external debts, and stability of currencies. Of the 100 companies surveyed, 26 had suffered a total of 39 cases of damage in the year ended last July 30. Iran topped the list of the notorious with a total of 14 cases. The most common damage involved non-payment for export deals, unilateral discontinuation of plant construction projects, and cancellation of export contracts. Those companies most severely affected were trading houses, banks and industrial plant makers.

The complete ranking list is presented below:

Rank		Country	Points	Rank		Country	Points
1981	1980			1981	1980		
1	1	United States	8.99	39	46	Chile	4.68
2	2	West Germany	8.68	40	44	Hungary	4.64
3	3	Switzerland	8.34	40	36	Nigeria	4.64
4	4	Canada	8.30	42	41	Czechoslovakia	4.62
5	5	Netherlands	7.84	43	48	Algeria	4.59
6	6	Australia	7.81	44	41	Panama	4.58
7	6	Belgium	7.67	45	39	Argentina	4.48
8	9	Britain	7.49	46	43	Ecuador	4.32
9	8	France	7.36	47	50	Egypt	4.28
10	14	New Zealand	7.33	48	47	India	4.27
11	10	Singapore	7.30	49	49	Romania	4.23
12	11	Sweden	7.24	50	-	Sri Lanka	4.15
13	13	Norway	7.21	51	52	Peru	4.08
14	12	Austria	7.08	52	54	Libya	3.92
15	17	Denmark	6.96	52	55	Kenya	3.92

16	16	Hong Kong	6.76
17	19	Malaysia	6.26
18	21	Saudi Arabia	6.14
19	22	Taiwan	6.07
20	20	Ireland	6.06
21	25	Kuwait	5.99
22	22	Spain	5.96
23	18	Mexico	5.95
24	29	Italy	5.88
25	26	Venezuela	5.67
26	15	United Arab Emirates	5.62
27	31	Indonesia	5.61
28	27	Greece	5.55
29	32	South Korea	5.54
30	27	Soviet Union	5.44
31	37	Portugal	5.29
32	35	Thailand	5.25
33	30	Brazil	5.23
34	40	South Africa	5.21
35	32	China	5.05
36	24	Philippines	5.01
37	34	East Germany	4.97
38	38	Colombia	4.71

54	51	Israel	3.90
55	53	Ivory Coast	3.80
56	45	Iraq	3.68
57	57	Burma	3.61
58	61	Liberia	3.57
59	58	Pakistan	3.36
60	56	Bolivia	3.10
61	65	Mozambique	3.08
62	59	Syria	3.06
63	63	Ghana	3.05
64	-	Poland	3.03
65	66	Sudan	2.88
66	62	Bangladesh	2.85
67	73	Cambodia	2.73
67	69	Turkey	2.73
67	70	Congo	2.73
70	68	Vietnam	2.67
71	72	Zaire	2.60
72	67	North Korea	2.57
73	70	Ethiopia	2.39
74	64	Lebanon	2.33
75	73	Iran	2.19
76	75	Afghanistan	1.78

CSO: 4120/2

KAWASAKI PICKED AS MT-X PRIME CONTRACTOR

Tokyo JPE AVIATION REPORT-WEEKLY in English No 537, 9 Sep 81 p 9

[Text]

The JDA has decided to award Kawasaki Heavy Industries Ltd. (KHI) a ¥300,000 million prime contract for the development and production of the MT-X next-generation intermediate trainer for the ASDF. But it intends to let two other competitors, Mitsubishi Heavy Industries Ltd. (MHI) and Fuji Heavy Industries Ltd. (FHI), to have almost equal shares with the prime contractor in the production, in order to secure a balanced development of the three major aircraft manufacturers.

Although a prime contractor usually has an absolute superiority over subcontractors, the JDA plans to shrink their gap in regard to the MT-X contract in consideration of the Ministry of International Trade and Industry's policy of promoting the whole Japanese aircraft industry.

The MT-X will replace the T-1 developed by FHI and the T-33 produced by KHI under license of Lockheed Corp. Its maximum speed will be Mach 0.9 and its take-off distance will be 610 meters. The JDA is expected to obtain 200 to 250 aircraft.

KHI and FHI had been expected to compete for the MT-X contract. But MHI, which has experienced the development of the T-2 advanced trainer, joined their competition. Originally, MHI had been seen as the most promising candidate for the MT-X prime contractor because of its technological superiority. Eventually, however, KHI has won in the three-way competition.

CSO: 4120/3

MITI DEMANDS ¥1,502 MILLION FOR Y-XX PROGRAM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 537, 9 Sep 81 pp 9-10

[Text]

The Ministry of International Trade and Industry (MITI) has earmarked ¥1,502 million in its FY 1982 budget request for the development of the Y-XX 150-seat-class commercial transport starting in the current fiscal year. The FY 1981 budget has set aside ¥353 million for the Y-XX program.

With the MITI budget request in mind, the Japanese aircraft industry may call a top-level meeting in September to determine how to proceed with selection of a foreign partner in the Y-XX program after the McDonnell Douglas Corp./Fokker group and Boeing Co. proposed to the Japanese in August to take part in development of specific aircraft corresponding to the Y-XX. Prior to the top-level session, working-level representatives of Civil Transport Development Corp., Mitsubishi Heavy Industries Ltd., Kawasaki Heavy Industries Ltd., and Fuji Heavy Industries Ltd. may meet to exchange views on the McDonnell Douglas/Fokker MDF-100 and the Boeing 7-7 proposals.

Although industry sources term both of the proposals basically acceptable, the industry will consider which is more feasible and more favorable to the Japanese.

The MITI budget request also calls for ¥403 million (¥2,043 million in FY 1981) for the Japan-Boeing-Italy Boeing 767 (Y-X) program and ¥5,402 million (¥4,722 million) for the Japan/Rolls-Royce development of the RJ500 (XJB) aero engine featuring low noise, low pollution and enhanced fuel efficiency. The B-767 program is a shift to the production stage from the current development phase in FY 1982.

CSO: 4120/3

END

JPRS 79243

19 October 1981

Japan Report

No. 136

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79243

19 October 1981

JAPAN REPORT

No. 136

CONTENTS

SCIENCE AND TECHNOLOGY

Present, Future Outlook for Japanese Oil Exploration
(Toshiaki Kitamura; TSUSAN JANARU, Aug 81)........................ 1

Collapse of Toyota-Ford Tie-Up Studied
(TOKI NO KEIZAI, Jul 81).. 6

Development of ERS-1 Satellite To Begin
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81).......................... 15

Major Military R&D Projects for FY 1982
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81).......................... 16

Aircraft Industry Leaders Discuss Y-XX
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81).......................... 19

New Body To Be Set Up for RJ500 Program
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 20

KHI Officially Named MT-X Prime Contractor
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 21

IHI Eager To Get XF-3 Adopted for MT-X
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 23

TR&DI Ends Initial Tests on Scout/Warning APC
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 24

Full-Scale AW-X Development To Be Launched in FY 1982
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 25

¥86,700 Million Requested for Space Development in FY 1982
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81).......................... 26

Partner for Y-XX Program To Be Selected by November
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)........................ 27

SJAC To Set Up Three Ad Hoc Committees
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)........................ 29

MT-X Development Schedule Given
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)........................ 30

MILITARY

Defense May Achieve 63.9 Percent of Aircraft Funding Target by FY 1982
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81)......................... 32

MSDF Shipbuilding Programs Reported
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81)......................... 34

ASDF/McDonnell Douglas F-4EJ Modernization Program Outlined
(JPE AVIATION REPORT-WEEKLY, 16 Sep 81)......................... 37

JDA To Study Patriot, Nike Phoenix as SAM-X
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 38

GSDF To Attach Priority to Tanks, Guns in New MTDP
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 39

JDA To Order 68 Wheeled APC's by FY 1984
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 41

Komatsu Likely To Undertake 203mm HSP License Production
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 42

MSDF To Adopt MK-46 Torpedo for P-3C
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 43

MSDF To Acquire First New DD Destroyer in March 1982
(JPE AVIATION REPORT-WEEKLY, 23 Sep 81)......................... 44

U.S. Agrees To Supply Country With F-15 Technical Data
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)......................... 45

JDA's Aircraft Ordering Program for FY '82
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)......................... 46

ASDF Requests Second F-15 Simulator
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)......................... 48

JDA To Adopt Patriot as SAM-X by FY '83
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)......................... 49

ASDF Picks Kaiser's HUD for F-4EJ
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)....................... 50

Two Helicopters as V-107 Replacements Set
(JPE AVIATION REPORT-WEEKLY, 30 Sep 81)....................... 51

Briefs
- 16 VADS AA Guns 52
- SH-X Project 52

PRESENT, FUTURE OUTLOOK FOR JAPANESE OIL EXPLORATION

Tokyo TSUSAN JANARU in Japanese Aug 81 pp 64-71

[Article by Toshiaki Kitamura, Exploration Section, Petroleum Division, Agency of Natural Resources and Energy]

[Text] Last May, successful test drillings were announced successively for the Aga Oki northern project in Niigata Prefecture in Japan and in the Bonai project in China.

In both cases, tests showed a considerable volume of oil flow. Even though it is impossible to judge the possibility of future commercial production or the scale of commercial oilfileds on the basis of these tests, it seems reasonable to have high expectations.

As is well known, Japan has not been actively engaged in oil production for very long. Petroleum development is a field which, because of its nature, requires financial strength and accumulated technological expertise and experience. So one could say that Japan started off under a large handicap.

However, through the combined efforts of both government and private sectors, Japanese petroleum development has expanded year by year. From an international viewpoint, we have not yet achieved a great deal, but certain results have accumulated, and the successful test drillings in the two recent projects are built upon this foundation.

Below I would like to give a brief outline of these two projects and discuss the present situation and future prospects of petroleum development in Japan.

Domestic Development of Petroleum and Natural Gas

The volume of petroleum and natural gas reserves in Japan is estimated at 1.3 billion kiloliters offshore and 0.2 billion kiloliters on land. The offshore reserves in particular are expected to make active and large-scale exploration worthwhile.

The present domestic production of petroleum and natural gas is approximately 3 million kiloliters (petroleum equivalent). Approximately 500,000 kiloliters come from the offshore gasfields and oilfields in Aga, Niigata Prefecture, which were discovered in 1972 and began producing in 1976.

Present offshore oilfields and gasfields are limited to Aga Oki. However, additional gasfields were discovered off the coast of Joban, and promising deposits have been identified off the coast of Teradomari and Yufutsu. Also, a Japan-ROK joint continental shelf development project is underway. So offshore petroleum development around Japan is progressing steadily, and the successful test drillings in the Aga Oki northern project will greatly encourage this progress.

In 1972, the New Japan Sea Petroleum Development K.K. received loans and investment from the Petroleum Development Corporation and began exploration. It is now making its third test drilling. Well No 3 is located 15 kilometers offshore from Niigata city under 88 meters of water. The drilling was carried out up to 220 meters using the "No 2 White Dragon" rig owned by the Petroleum Development Corporation, and six petroleum deposits have been discovered. A test was made on oil and gas in the sixth deposit, and the company was able to obtain approximately 2,000 to 5,000 barrels of crude petroleum per day and approximately 30,000 to 80,000 cubic meters of gas per day.

The crude petroleum discovered was rated at better than 30 API (American Petroleum Industry Association standards). It is a good-quality light oil.

It is difficult from these test results to estimate the scale of production when commercial production commences. However, the test results are much better than those obtained from the Aga offshore gasfields and oilfields which are now in production, so good results are expected from future exploration (the Aga offshore oilfields and gasfields presently produce approximately 1,000 barrels of petroleum per day and 1 million cubic meters of gas per day).

More thorough exploration will continue in the Aga northern project. More wells will be drilled to evaluate the lateral spread of the petroleum deposits. After the possibility of commercial production is confirmed, development will begin.

In addition, a decision was made in May of this year to begin development of the Joban Oki gasfields, which were discovered in 1973. They have subsequently been studied by Teikoku Petroleum, together with other companies, for feasibility of commercial production.

These gasfields are located 40 kilometers off Narabamachi, in Fukushima Prefecture. They contain confirmed natural gas reserves of approximately 5 billion cubic meters (equivalent to 5 million kiloliters of oil). By deciding to begin development, the company plans to supply 1.2 million cubic meters of gas per day by 1984.

Present domestic offshore production is approximately 2.2 million kiloliters (petroleum equivalent). A greenturf deposit has been discovered near Nagaoka city in Niigata Prefecture. In the future, this will be developed and active exploration will continue, chiefly around northeastern Honshu and Hokkaido.

Obviously, domestic oil and gas are the most stable supply sources. The securing of a local energy supply contributes to the economy of local regions and also plays an important role in creating the technological foundations for overseas petroleum development.

Our goal is to triple the present domestic production of oil and natural gas by 1990, and for this purpose it is necessary to expand measures for basic surveys of oil and natural gas resources by the government and loans and investment by the Patroleum Development Corporation for exploration.

Autonomous Development Overseas

The present amount of imported crude petroleum autonomously developed by Japan is 2.2 million kiloliters, about 8 percent of the total of oil imports.

There are about 40 projects being carried out by Japan around the world (limited to projects receiving assistance from the Japan Development Corporation). Of these, about 13 projects are in production, including Arabian Petroleum, Abu Dhabi Petroleum, Indonesia Petroleum, Japan Petroleum, and Zaire Petroleum.

In addition, there are six projects, including Thai Offshore and Sakhaiin Offshore, in which oil has been discovered; either preparations are underway for production or the feasibility of production is under study.

About 20 exploration projects are in progress in such areas as Southeast Asia, the Middle East, North America, and Central and South America.

The Chinese Bohai project is one of the large-scale projects now in the exploration phase.

This project was proposed by the Chinese as a joint project for petroleum development in the region. The proposal was made to the Japanese on the occasion of MITI Minister Komoto's visit to China in September 1978. Afterward, negotiations were carried on between the Chinese and the Petroleum Development Corporation.

A basic agreement was made between the two parties in December 1979. In April of the following year, a new company (Japan-China Petroleum Development K.K.) was organized to serve as the agent for promotion of this project from the Japanese side, and a formal agreement was made with the Chinese in May of the same year. This and the French project were the first exploration projects to be undertaken by foreign industry to develop Chinese petroleum.

Exploration work began in July of the same year, and the first test well was drilled in December. Drilling stopped at 3,300 meters in March 1981.

The production test of the first test well was successful. Some 1,000 tons of petroleum and 600,000 cubic meters of natural gas were obtained per day.

Examples of great success with a first test well are rare anywhere in the world. In Japan, the only similar successes were in the Arabian Petroleum and Abu Dhabi

Petroleum projects. (Internationally, the rate of success in first test well drillings is about one in four or five.)

Because of the large production result of 1,000 tons per day, success in future commercialization is likely.

It is worthy of note that the quality of the oil is API 41, making it a better quality light oil than Arabian light.

It is impossible to judge what scale of production can be expected when the oilfields go into commercial production until a complete physical survey is made of the target structure of the first well and an evaluation well is drilled. Judging from the size of the deposit, however, it seems reasonable to expect large-scale production.

If future exploration or development goes well, it is expected that production will begin around 1985.

The agreement provides that the Japanese will obtain approximately half the production volume from this project.

The Japanese are operating this project in the exploration and development phase. The success of the first test well has surely heightened the international reputation of Japanese capabilities in petroleum development technology.

During the 5-year exploration period, it is planned that 50 test wells (including evaluation wells) will be drilled. In addition to the target structure of the successful first test well, the discovery of other promising structures is expected.

Along with this project, the Japanese (Chengbei Petroleum Development K.K.) are proceeding to develop the previously discovered Chengbei oilfields in the western part of the Bohai. Production in these oilfields is expected to begin in 1984.

China is one of the only frontiers left for petroleum development. Beginning this fall, the countries of Europe and the United States are expected to compete in international bidding for petroleum development to take place in the Yellow Sea and the South China Sea. The Petroleum Development Corporation and other organizations in Japan are qualified to participate in the bidding, and it is necessary for them to enter the bidding aggressively, using the successful test drilling in the Bonai project for support.

In autonomous overseas development, there is a goal to increase the volume of imports by 20 percent by 1990. If the projects already begun run smoothly, it is estimated that we can expect 800,000 barrels per day of autonomously produced crude oil to be imported. More effort should be made toward this goal by vigorously working on new projects, including those in China.

By expanding the volume of autonomously produced crude oil, it will be possible to compensate for the future increase in Japanese oil imports. Besides greatly contributing to a stable supply of oil to Japan in the future, it is expected that this will help Japan fulfill its international obligations as a major consuming nation.

The activities of Japanese development companies expand year by year and are producing solid results. From an international point of view, however, in exploration and development investment, for example, total Japanese efforts, including government assistance, do not even match the investment of a single middle-size U.S. development company, let along one of the majors. There is also a tremendous gap in the number of technicians. Exxon alone has 4,000 technicians, compared to only 800 in all of Japan.

Petroleum development requires a much larger amount of financing than other industries. Also, the risk is great. Only 2 to 3 percent of test drillings lead to the discovery of commercial oilfields. Even in successful cases, a long time period is required for recovery of the investment.

Also, the circumstances surrounding petroleum development are less favorable. The geographical and natural conditions of target areas are becoming worse, and it is getting harder to obtain development concessions.

In such a situation, a greater effort by development companies is certainly necessary in order to expand autonomous development. And in light of the special conditions of petroleum development, the formulation of better policies by the government is also an urgent issue.

At present, the world petroleum market is oversupplied. However, this oversupply may well be fundamentally caused by a variety of short-term factors and be very unsubstantial. The basic conditions underlying the instability of midrange petroleum supply and demand must be firmly controlled. I would like once again to emphasize the importance of steady progress in petroleum development by Japan.

9651
CSO: 4105/222

COLLAPSE OF TOYOTA-FORD TIE-UP STUDIED

Tokyo TOKI NO KEIZAI in Japanese No 298, Jul 81 pp 22-27

[Text] The curtain fell all too quickly on the Toyota-Ford tie-up which created a sensation in the world's automobile circles as the "tie-up of the century." Even though this conclusion was anticipated by some from the very beginning, the world's enterprises are desperately trying to survive amid intense competition and trade friction.

Will "Tie-up of the Century" End In Misfire

22 May. Concerning the year long tie-up negotiations going on between Toyota Motor Co., Ltd. and America's Ford Company, when the intent "to abandon the joint venture company formula and convert to a license for production formula" was revealed, officials at other automobile companies promptly declared, "we knew this would happen from the beginning."

Depending on how it is taken, this is quite an insolent remark, and in actuality this kind of talk was whispered by some from the beginning.

This is not because the drama of tie-up negotiations was born from Toyota's or Ford's own conception, but it had the character of a "malformed illegitimate child" brought about by Japan-U.S. trade friction. There was a strong political coloring in it from the start. It can be said that for Toyota, which was pressed into choosing "either export regulation or local production" in order to ease the friction, the situation was one of having to get up and do something.

Therefore, "Toyota now had a reason for abandoning the joint venture plan with Ford" at the point where self-imposed export regulation of Japanese automobiles progressed just as the U.S. wanted and one period in the "Japan-U.S. automobile war" ended.

It was a question of time for Toyota, which was planning the timing for when and where to cause a miscarriage, to indicate its intention. (business leader) It was as natural as natural can be to have this kind of viewpoint.

The forecast was right on target. Several days later Toyota announced it was abandoning its joint venture plan. In the final analysis, the result was just as conjectured, that is, "Toyota is playing for time."

It probably is not a consequence of that, but Toyota's expression of its intention was somewhat inarticulate and its statement, "it can be anticipated the joint venture company formula in which each invests half will run up against various difficulties and troublesome problems in terms of management, and it has now become a question of whether the original plan (the joint venture company formula) is suitable or not," was vague.

Concerning whether Ford will accept the rescinding of the joint venture plan or not, Toyota confined itself to its own impressions: "Ford is also examining this." As for future negotiations, it is said the intent is to "hold administrative level meetings during the month of June and formally propose the license to produce formula to Ford."

Since in the previous negotiations (March), both companies agreed that the car style would be the improved "Town-S," a cab-over wagon, it seems Toyota intends to push forward with concrete negotiations with Ford, proposing a formula in which it turns over to Ford the desing drawings of the Town-S and gives it the production rights, including a partial tie-up for car parts, that is, the license to produce formula.

At any rate, the curtain fell all too soon on the "tie-up of the century drama" which created a sensation with great fanfare. To that extent, it may be said the "collapse view" persistently whispered from the start hinted at a complex backstage. Anyhow it can be said that it has left a very bad aftertaste.

Only Mass Media In Uproar.

When we try to trace what is behind the tie-up drama in order to look for the truth in the rumors, an unanticipated aspect rises to the surface.

First of all let's turn back the focus to the day on which the tie-up was announced and then hunt for details.

It was the 7:00 o'clock NHK evening news on 9 July last year which let out the first report of the Toyota-Ford tie-up. The substance of the report was that Toyota and Ford will tie up and Toyo Kogyo Co., Ltd. will also join in; and Ford will make an investment of its non-operating factories; monthly production will be 20,000 cars and production will start as early as 1981.

Hearing the NHK news with great surprise, it was the mass communications companies which suddenly became excited. However on that very day, President Eiji Toyota, the key to all this, was away in Washington. Finally, NHK went to the Ministry of International Trade and Industry (MITI) just two hours before televising, and grabbed Hiroyasu Ono, managing director (Toyota Motor Co., Ltd. Tokyo Branch president) who had come to the Keidanren (Federation of Economic Organizations) building and a press conference was held at 9:30 p.m.

On the other hand, Toyo Kogyo Co., Ltd. was quick with a counterplan. On that same night, President Yoshiki Yamazaki was also present at a press conference and hinted at a "three company tie-up" which included his own company. Ichiro Isoda, president of The Sumitomo Bank, Ltd. held a press conference the next day on the 10th.

With this shocking news of a tie-up between two great manufacturers of Japan and the U.S., other competitor companies reacted responsively. For example, consternation could be seen when officials from Mitsubishi Motor Co., Ltd. and Mitsui & Co., Ltd. got together at a restaurant on the night of the 10th and exchanged information.

As can be seen in the above, those who knew about the NHK report in advance were top executives of Toyota and Ford, leaders of Toyo Kogyo and Sumitomo Bank, and some officials at MITI and in the Liberal Democratic Party (LDP).

However, comments from Toyota, which is the star in this negotiations drama, and Toyo Kogyo and Sumitomo Bank, which are the other concerned parties, show subtle differences in view. In one angry scene, an upset Toyota official said, "we don't remember agreeing to Toyo Kogyo's capital participation. Talks about to be concluded may not come to a conclusion with such glib talk. We are not sure whether we would let them into the discussions in the future."

A tie-up between enterprises is troublesome. It is more so when the partners are large enterprises of different nationalities.

The following occurred on 28 July after these troubles had been experienced. In the afternoon of the 28th, Toyota's President Eiji Toyota ran around without any rest, visiting Prime Minister Zenko Suzuki, Chief Cabinet Secretary Kiichi Miyazawa, MITI Minister Rokusuki Tanaka and other important government and LDP leaders. This was in order to report the course of negotiations with Ford was making very slow progress and to request the government's support in actualizing the tie-up.

On the other hand, Nissan Motor Co., Ltd., with headquarters located in Ginza-Roku-chome section of Tokyo, was feverishly dealing with the mass media. It had informally decided to scout Marvin T. Runyon, former vice-president of production at Ford, as president of "Nissan Motor Manufacturing" which had just been set up in Delaware to manufacture small sized trucks.

Around that time, in a room in one of the major city banks in the capital, several leaders sat tensely around a one page memo. It seems the content of the memo concerned the Ford-Toyota tie-up and stated Ford would have a major announcement by 5 August.

These three occurrences on the afternoon of that Monday each had its own character and had no logical connection to the others, but in some sense, they were more than accidents; it was as though they were manipulated by one string revolving around the Ford cog. In other words, it can be said that the Toyota-Ford tie-up negotiations hinted at these three occurrences.

Eiji Toyota, who met individually with very important leaders in the government and LDP, stated in answer to reporters' questions, "we have only agreed to continue our talks with Ford; nothing is yet definitely decided." If this is true, the memo the city banks had, that is, the information that "Ford will refuse Toyota's proposal by 5 August" curiously takes on the graphic flavor of reality, and the fact that President Toyota requested the government's cooperation also fits.

To put it strongly, it can be said "Toyota has fallen into the depths of a dilemma by making shrewd Ford its partner." (business world leader)

The authenticity is not certain but it is said that one of the Toyota executives uttered the following by accident at a gathering of some financial men. "When I think about it now, Kohei Matsuda of Toyo Kogyo, who fought alone with Ford as its partner, was quite an actor."

Shrewd Ford's Multi-faceted Strategy

The Toyota-Ford tie-up talks began to show subtle development around 20 July.

Sumitomo Bank President Ichiro Isoda until now emphasized the "three company tie-up" which included Toyo Kogyo and his "underlying intention" of trying not to miss the current of the times was clearly understood. On the 22nd, he suddenly changed his tone, saying, "both Toyota and Ford should not call off the joint venture plan."

At about the same time, Yoshiki Yamazaki of Toyo Kogyo stated, "this plan has already been rejected. The mass media reports are not altogether accurate."

Don't be surprised, but there are indications that Sumitomo Bank and Toyo Kogyo caught in advance the news that Ford will reject Toyota's proposal.

It is understandable that Toyo Kogyo, which has a capital partnership with Ford, and Sumitomo Bank, which acted as intermediary, are in the position of being able to obtain "information" quickly, but even so, why did they have to release it publicly in such a way. If Ford had that as a deliberate intent, whatever was Ford's aim in carrying out such an elaborate drama?

However, in the memo the major city banks had acquired, there was one more item which caused concern. It is the puzzling item that Ford will make a major announcement by 5 August.

But this puzzle was unexpectedly settled early. On the 4th, Ford brought a case to the ITC (U.S. International Trade Council) for the regulation of Japanese car imports to the 1974-76 level, using as the basis "the 201 articles of the 1974 commerce law."

The case has taken the form of joing the UAW (United Automobile Workers' Union) lawsuit filed on 12 June. It remained somewhat unnatural for Ford to be the first, taking over the lead from Chrysler which had been driven into a corner just before bankruptcy. Moreover, the substance of the case explicitly aimed not at making all imported cars the target, but at shutting out only Japanese cars.

Then, as one reason why Ford took a bold course in this case, it was stated that "we called on Japan to invest in the U.S., but Japan's business world ignored this and expanded facilities domestically."

Therein lies Ford's attitude which completely ignored Toyota which tried to start negotiations. Even so, why did Ford toake a bold course with this case which hurt Toyota's feelings? Depending on how it is considered, it is not too much to say that alienating Toyota was the "major" announcement.

Viewed sympathetically, 1. Ford has in an American business-like fashion left no doubt that tie-up negotiations and the case are separate issues; 2. As a measure for the union, it imputed responsibility for management's failure to Japanese automobiles. But if so, the question still remains why did Ford exclude from the lawsuit foreign cars other than Japanese cars? Perhaps it wanted the regulation of imports more than the tie-up, or maybe Ford estimated in its intent toward Toyota it could make favorable progress in the negotiations if it shook Toyota with the lawsuit.

Be that as it may, Ford is certainly a strong partner for Toyota.

Jumping ahead in our discussion, Nissan Motor Co., Ltd. seemed to have thoroughly calculated this shrewdness of Ford. Therefore, "it was amazed at the news of the Toyota-Ford tie-up," (President Shun Ishihara) and it had doubts about the partnership.

Those who supported such thinking were three foreign lobbyists who are in the inner circle of Nissan.

One of them is George Allen, president of Potomac International Consultants. He was an adviser to Republican presidentail candidate Reagan and it was said he would become Secretary of State if a Reagan administration came into being. U.S. Nissan contracted with Allen as an adviser.

One is Everly, former USTR representative who vehemently pushed Japan for liberalization as special trade negotiation representative at the Hakone conference in 1972. He contracted with Nissan in September the year before last, and was a central figure who advised and implemented the local production of small sized trucks in the U.S.

The third is Wolf (former USTR assistant representative) who contracted as legal adviser last year.

Seeing the on-location top secrets sent almost daily by these three lobbyists, President Ishihara crystallized his plans for a bold foreign strategy. Interestingly, President Ishihara also had examined the formula of joint production in the U.S. However, his answer was "no." Therefore, he stated that if the Toyota-Ford tie-up "goes OK, it means our investigative capacity is superficial."

It is said that upon making exact calculations with this vigorous intelligence network, Nissan scouted Marvin T. Runyon, former Ford vice-president, as one part of its countermeasures for the U.S. market after assessing there would be not tie-up between Toyota and Ford. Because of this background, it can be said these three occurrences of 28 July are exceedingly revealing.

Nissan's Judgment Declining Joint Production

Let's explain a little more the details of why Nissan Motor Co., Ltd. examined the plan for joint production in the U.S. and abandonned it in the end.

Ford gave the opportunity for joint production. Ford proposed talks on the sale of its plant in Mawah, New Jersey to Toyota and Nissan with the permanent shutdown of that plant. At one time, Nissan President Ishihara, who received the offer, gave serious consideration to using this plant and doing joint manufacturing with Ford, but somehow there were many demerits and so he abandoned the idea in the end.

On the other hand, Toyota set up a project team for an advance into the U.S. for local production in the U.S., and examined it all from many angles, but no conclusion was forthcoming. In the meantime, the initiative was taken by Honda Motor Co., Ltd. and Nissan, and the local production plan was totally delayed.

At this juncture, the Japan-U.S. automobile friction intensified day by day and pressure from the UAW and the U.S. government escalated steadily. USTR representative Askew, unable to contain himself, strongly urged Toyota, which has lost the timing in such circumstances, to make an advance into the U.S. It was at this time that Toyota was persuaded by MITI Vice-minister Toshihiko Yano to launch into plants at the earliest opportunity.

It is said that Toyota, put into a difficult position, solidified its intent to launch into the joint production formula with Ford. Ford, having received the proposal from Toyota, placed Harold Poling, executive vice-president who is the top executive for the North America region and who is well versed in U.S. domestic strategy starting with small car development and production plants, as the top executive for these tie-up negotiations.

For Ford which had a large deficit and was facing the greatest crisis since its founding, joint production with Toyota would first of all fulfill the role of an emergency measure in order to deal with the sudden turn in the U.S. market. At the same time, it may become a great stimulus for renovating the lagging small car production process. In addition, small car development investment could be economized.

If joint production is undertaken, the overseas investment risk would be small even for Toyota and would relate to a solution of trade friction. The number of days until the start of production would be shortened since part of the existing facilities could be used. The views of both Toyota and Ford unexpectedly coincide.

However, even though Ford's complex position of on the one hand playing for time by lowering the flag of free trade principles traditional until now and urging the regulation of Japanese automobile imports, and on the other hand groping for joint production with Toyota, seems to be a "desperate" tactic which threw away the honor of a distinguished industry. Actually, it was nothing other than a declaration, "we are capable of doing anything to protect our position of the world's number two automobile manufacturer."

As far as it goes, it seems it can be said that Nissan's "calculations" of Ford hit the mark.

Desperate Measure To Avoid Japan-U.S. Automobile Friction

It was predestined that Toyota chose Ford as its partner for joint production.

Forty-eight years ago, in 1933, President Zenichiro Toyota, Toyota's founder, used genuine Ford parts in a trial manufacture of demoestically manufactured automobiles, and contact began between the two companies. Then in 1950, Shotaro Kamiya proposed to Ford a technological tie-up but it ened in failure. During that time, both Eiji Toyota and Shoichi Saito (adviser to Toyota Motor Co., Ltd.) went to the U.S. and did technological research study.

Again in 1960, Toyota sounded out Ford on the establishment of a joint venture company, but it ended unsuccessfully. However, "exchange" continued on a scanty basis, such as, Ford's second generation toured Toyota's factories in June 1978.

Thus, Ford decided on a 25 percent capital participation in Toyo Kogyo in November 1979, and around that time, Toyota formed a project team for an advance into the U.S. The movement materialized the following year in January 1980, and on 29 January, Eiji Toyota attended the Japan-UK automobile conference in Acapulco, and on his return, inspected Ford's Pico Rivero plant (operations ceased on 10 January and shut down permanently on 8 February). Several days later, Chairman Masayuki Kato of Toyota Motor Sales Co., Ltd. also visited the plant.

On the other hand, at the end of February, Ford's investigative staff visited Japan and made inspection tours of Mitusbishi Motor Co., Ltd., Toyo Kogyo Motor Co., Ltd. and Isuzu Motors Limited and drew up a "top secret report" based on that. Both Toyota and Ford finally began to move.

On 8 April, Toyota announced to the effect it would make investigations for the construction of a factory in the U.S. and on the 17th, Nissan announced its advance into a U.S. factory. Subsequently, on 2 May at the Japan-U.S.

summit conference, President Carter requested local production of former Prime Minister Masayoshi Ohira, and also proposed an advance by means of the joint production formula.

In the middle of the month, USTR representative Askew visited Japan and launched talks with the government. He visited Toyota and requested a plant advance into the U.S. At the end of the month, Toyota opened its joint manufacturing and sales high level policy meeting, and at the meeting, President Eiji Toyota presented a memo outlining a cooperative system with Ford to top officials at or above the vice-president level. Based on this memo, he drew up a personal letter to Ford President Petersen. Then early in June, Mamoru Tanaka, executive director of Nippon Denso Co., Ltd., who visited Ford as a special envoy of Eiji Toyota, met Vice-president MacDougal and gave him the personal letter addressed to President Petersen. One week later, Toyota received a reply of acceptance to talks from Ford.

In the middle of the month, Vice-president Shigenobu Yamamoto of Toyota met with a high official at MITI and reported the opening of talks with Ford on joint production. On the 23rd, President Petersen visited Japan and held talks with Sumitomo Banka President Isoda and the next day, on the 24th, Petersen visited Toyota and held a secret meeting with Eiji Toyota and top officials. Later, Toyota went to Sumitomo Bank and had discussions with President Isoda.

Just as can be understood from the above, I think the particulars will become clear that Toyota chose Ford as its "fiance" as one measure for dealing with Japan-U.S. automobile friction which has been brought to political ground. Indeed, at present the positions of the one choosing and the one being chosen have become reversed.

Is The Culprit Of The Leak MITI Or LDP

Let's consider again the question at its origin.

Because the shocking Toyota-Ford joint plan is still "only an agreement to talk about a tie-up," nothing concrete has been decided. Despite this, this clean slate "joint plan" was reported by NHK just as it was, a paper plan.

Since the contents were reported in rather detailed manner, it was obvious that someone involved revealed the information to NHK. Then, it is still a puzzle and a question who leaked this plan and for what purpose.

The first one that comes to mind is Ford. Then, it may be counterargued that the fact Ford appealed to the ITC is contradictory, but when it is considered from the angle in opposition to the aforementioned, it can be taken as a gesture to UAW. Indeed, it is totally possible that Ford, while acting as if it regards Japanese cars with emnity, would advance talks in terms of profitability.

On the other hand, it is thought that it would not be common sense for Toyota to reveal the plan since it is the designer of the plan. But if Toyota used the tie-up talks to buy time, it is possible the leak came from Toyota.

In the case of Sumitomo Bank and Toyo Kogyo, there was the fear they would be placed in the upper gallery in the Toyota-Ford talks and would be bypassed, and when the demerits of being left out in the cold are considered, publicly announcing the plan of these two companies at this juncture and appealing to the public for their own existence can be said to be one strategy. In that sense, there are elements indicating they are the ones who offered the information to NHK.

MITI and LDP were put on the rumor's chopping clock as the "culprits" of the leak. Political consideration of Japan-U.S. trade friction was reported as the basis. If viewed from the fact that the report was aimed at President Carter's visit to Japan, it is indeed a story with truth. There was one scene where the witty viewpoint was whispered that a deal was made as a condition for NHK's cooperation in the general election.

At any rate, a decision was made to impose regulations on automobile exports to the U.S., a political priority outrivaling the industry's dissatisfaction. Toyota caused the "miscarriage" of the joint venture plan with Ford. Whether by design or by accident, the Toyota-Ford tie-up drama ended being a "house of cards" just as was whispered from the very start.

There is no answer to the question whether the plan disintegrated as a result of rejection by the egos of these two large enterprises or was it an abortive flower which bloomed in a ravine of political priorities, but these were the backstage happenings in this quite unpleasant "Japan-U.S. automobile war."

9400
CSO: 4105/249

DEVELOPMENT OF ERS-1 SATELLITE TO BEGIN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 p 10

[Text]

Japan will start the development of the ERS-1 earth resources satellite, the GMS-3 geostationary meteorological satellite and the experimental H-1 liquid fuel two-stage rocket in FY 1982, according to a space development program put forward by the Space Activities Commission in late August.

The ERS-1 will be launched with the H-1 rocket around FY 1987. The Science & Technology Agency and the Ministry of International Trade and Industry, (which failed to get the ERS-1 development funded in FY 1981), have incorporated the development into their budget requests for FY 1982.

The GMS-3 will be launched in the summer of 1984 with the N-II rocket, while the experimental H-1 rocket will be test fired in FY 1985.

As for satellite launching programs for the near future, the commission has decided to delay the launching of the MOS-1 maritime observation satellite, originally planned for FY 1984, until late FY 1986 because it would take a long time to purchase parts for the satellite from the United States. It has also decided to postpone the National Aerospace Laboratory's (NAL) launching of the PLANET-A 10th scientific satellite and the ASTRO-C 11th scientific satellite until FY 1985 and 1986, respectively. The NAL had planned to lift the PLANET-A in FY 1984 and the ASTRO-C in FY 1985 with the M rockets.

CSO: 4220/16

MAJOR MILITARY R&D PROJECTS FOR FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 pp 7-10

[Text]

The JDA's Technical R&D Institute (TR&DI) in its budget request for FY 1982 has called for ¥16,886 million in FY 1982 expenditure and ¥34,631 million in disbursement from FY 1983 on, for research and development of new weapons systems.

Aircraft and Related Systems

The requested R&D funds include: ¥980 million in FY 1982 expenditure and ¥6,605 million in follow-on disbursement for four aircraft-related items--the MT-X new intermediate trainer (¥7,360 million, inclusive of ¥6,605 million in follow-on disbursement), the target drone (¥140 million), the aircraft system simulator (¥60 million) and the composite material structure for aircraft (¥30 million).

The MT-X funds are designed to finance detailed design work from FY 1982 to 1983 and partial fabrication in FY 1983 after basic design work, which is to start soon, with ¥1,900 million earmarked in the FY 1981 budget. The TR&DI is expected to request more than ¥30,000 million in FY 1983 to fabricate four prototypes for flight tests and two for fatigue tests in three years from the year. The first flight of the aircraft is planned for the end of FY 1985. Flight tests are scheduled to continue for two years.

Before the fabrication, the TR&DI will select the engine and systems aboard the new trainer. The engine's thrust is planned at 1.6 tons or more. The on-board systems will include communications equipment, the TACAN (tactical air navigation system) and other navigation system, the head-up display and test equipment.

As for the target drone, the TR&DI had originally intended to request ¥1,700 million for fabrication of a full system. The eventually-requested ¥140 million is planned for design work with the fabrication expected to be funded in FY 1983.

Guided Weapons

The TR&DI has set aside ¥9,635 million (¥1,526 million in FY 1982 expenditure and ¥8,109 million in follow-on disbursement) for eight guided weapon related R&D items.

The eight items are: the XSSM-1 ground-launched antiship missile (¥7,760 million), the Chu-MAT antitank missile (¥620 million), the air combat missile (¥540 million), the portable surface-to-air missile (¥260 million), the experimental rocket engine (¥50 million), the electronic scanning antenna for homing systems (¥120 million), the CDB (composite double base) rocket motor (¥50 million), and the precision guided simulator (¥235 million).

The XSSM-1 for the GSDF is based on the ASDF ASM-1 air-launched antiship missile. Since FY 1979, the propulsion system, homing head, inertial navigation system, rocket motor, and other key components have been fabricated. The XSSM-1 program will shift to the full-scale development phase with fabrication of a full system started in FY 1982. The new missile's development will be completed by FY 1987.

The Chu-MAT is designed as a replacement of the Model 64 MAT antitank missile. It will be smaller, lighter and more maneuverable than the Model 64. The TR&DI intends to complete its development by FY 1984 for service entry certification in FY 1985.

The electronic scanning antenna and the CDB rocket motor will be developed to increase homing and propulsion capabilities of the Tan-SAM short-range surface-to-air missile, which is to enter service in the current fiscal year.

The precision guided simulator will be used for testing image homing missiles. Its development has reached the final phase.

Military Electronics

The TR&DI has earmarked ¥5,734 million (¥1,565 million in FY 1982 expenditure and ¥4,169 million in follow-on disbursement) for 14 military electronics R&D items--five engineering development items, six research and fabrication items and three basic research items.

The five engineering development items are: the new antimortar radar (¥620 million), the TASS (towed array surveillance system) passive sonar (¥620 million), the XJ/ALR-1 ECM (electronic countermeasure) system (¥450 million), the XJ/ALQ-5 ECM system (¥1,260 million) and the XJ/ALQ-8 ECM system (¥70 million).

The new antimortar radar will replace the current JAM/MPQ-NI. It will be capable of tracking multiple targets simultaneously. Integrated circuits (IC) will be used in the new radar instead of electronic tubes and its radar range will be expanded. The new radar will be mounted on vehicles for higher mobility.

Of the ECM systems, the ALQ-5 is planned for the C-1 transport and the ALQ-8 for the F-15J fighter-interceptor.

The six research and fabrication items are: the radar electronic warfare simulator (¥1,290 million), the infrared sensor (¥940 million), the secret communication system (¥170 million), the stationary magnetometer (¥110 million), the low-noise sonar dome (¥50 million), and the new mine detector (¥30 million). Top priority has been given to the radar electronic warfare simulator. The stationary magnetometer and the mine detector are new items.

The three basic research items are: the future fire-control system (¥80 million), the modular ECM system (¥30 million), and the radio wave absorber (¥30 million). The latter two are new items.

CSO: 4220/16

AIRCRAFT INDUSTRY LEADERS DISCUSS Y-XX

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 pp 1,2

[Text]

Leaders of the Japanese aircraft industry met in Tokyo in early September, apparently to discuss how to select a foreign partner for the development and production of the Y-XX 150-seat-class commercial transport.

They are believed to have agreed to study three foreign aircraft development proposals in more detail before the final selection. The three aircraft proposed for Japan's Y-XX program are the MDF-100 of the McDonnell Douglas/Fokker group, the Boeing 7-7 of Boeing Co. and the A320 of Airbus Industrie. The Japanese study is expected to center on possible business arrangements for the international development of the proposed aircraft, Japan's shares in the development, the feasibility of the three programs, and Japan's participation in sales and product support activities.

A top-level meeting was held at the initiative of Civil Transport Development Corp. (CTDC). Participants include: Director-Consultant Gakuji Moriya and Managing Director Kenji Ikeda from Mitsubishi Heavy Industries Ltd., Chairman Zenji Umeda and Managing Director Teruaki Yamada from Kawasaki Heavy Industries Ltd.; Managing Director Iwao Shibuya from Fuji Heavy Industries Ltd.; and Chairman Eiichi Ohara, Vice Chairmen Kenji Uchino and Eiichi Yamaguchi, and Managing Director Reizo Wakasugi from CTDC.

They have also discussed a recommendation prepared by the Aircraft Committee of the Aircraft & Machinery Industry Council, an advisory body to the Ministry of International Trade and Industry, in August, which called for, among others, the private sector's takeover of the semigovernmental Nihon Aeroplane Manufacturing Co.'s business and the establishment of a new Japanese corporation to undertake production of the Boeing 767 (Y-X) after a development phase ending next year, according to a report.

CSO: 4220/16

NEW BODY TO BE SET UP FOR RJ500 PROGRAM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 p 1

[Text]

Ishikawajima-Harima Heavy Industries Co. (IHI), Kawasaki Heavy Industries Ltd. (KHI) and Mitsubishi Heavy Industries Ltd. (MHI), will soon set up a new non-profit organization for their joint program with Rolls-Royce Ltd. for the development of the RJ500 aircraft engine.

This move complies with a recommendation prepared by the Aircraft Committee of the Aircraft and Machinery Industry Council, an advisory body to the Ministry of International Trade and Industry (MITI), in August, which called on the three Japanese RJ500 program promoters to establish a new organization separately from corporations for development of airframes, pointing out that if a single corporation is engaged in development of both airframes and engines, it would be difficult for the corporation to sell other airframe manufacturers the engines. MHI and KHI manufacture airframes as well as engines.

So far, the three Japanese firms have proceeded with the RJ500 program nominally through the Engineering Research Association for Aerojet Engines.

The new non-profit corporation is tentatively named "the Nippon Jet Engine Kaihatsu Kyokai (Japan Jet Engine Development Corporation)." It will consist of 15 men initially and 30 in the spring of 1982. It will take over the firms' contracts with Rolls-Royce for the RJ500 program.

The new corporation will be headed by Taiji Ubukata, IHI President. Yoshifumi Harayama, Director of Electric Power Development Co., will be appointed Managing Director. Harayama has served as member of the Bank of Japan Policy Board as well as a ranking MITI official.

CSO: 4120/15

KHI OFFICIALLY NAMED MT-X PRIME CONTRACTOR

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 1-3

[Text]

The Japanese Defense Agency (JDA) has officially named Kawasaki Heavy Industries Ltd. (KHI) as prime contractor and Mitsubishi Heavy Industries Ltd. (MHI) and Fuji Heavy Industries Ltd. (FHI) as subcontractors for the development and production of the MT-X new intermediate trainer aircraft for the Air Self-Defense Force (ASDF).

Shares of the MT-X development program are about 40 percent for KHI and about 30 percent each for MHI and FHI. An MT-X engineering team, which will start basic design work in October, will consist of 40 to 50 engineers from KHI, about 30 each from MHI and FHI, and several of each from Shin Meiwa Industry Co., Japan Aircraft Mfg. Co. and other airframe manufacturers. Its chief engineer will be, H. Isozaki, of KHI's aircraft division.

KHI as prime contractor will develop the front fuselage section, assemble the full system, and conduct flight tests. The middle and rear fuselage sections are set aside for MHI, and the main wing and nose for FHI. Among other sections, the landing gear may be developed by Sumitomo Precision Products Co., sections below the wing by Japan Aircraft Mfg., the drop tank by Shin Meiwa, the engine by Ishikawajima-Harima Heavy Industries Co. (IHI), and the ejection seat by Daisel Ltd.

Airframe parts may be produced by Teijin Seiki Co., Kayaba Industry Co., and Shinko Electric Co. In addition, Mitsubishi Electric Corp., Nippon Electric Co., Toshiba Corp., Japan Aviation Electronic Industry Co., Shimadzu Corp., Tokyo Keiki Co., Tokyo Aircraft Instrument Co., Hokushin Electric Works Ltd., and others will take part in production of components for installment on the new trainer.

The ASDF's major MT-X requirements are the total weight of about 5.5 tons, two 1.66-ton-thrust turbofan engines, the maximum speed at Mach 0.9, the maximum climb rate at about 10,000 feet per minute and the flight range at 700 nautical miles. Priority is given to the speed, climb rate, flight range and maneuverability.

The maximum climb rate has been set at that level for the reason that MT-X trainers departing from Ashiya and Hamamatsu ASDF bases must fly at an altitude of 7,500 feet before reaching training spaces over the sea and ascend sharply up to an altitude of 20,000 to 25,000 feet in the training spaces in order to avoid commercial air routes.

As to the flight range, the MT-X without an auxiliary fuel tank is required to outstrip the current T-1 and T-33 trainers with such tanks. Even with auxiliary fuel tanks, the T-1 and T-33 can engage in only short-time training, because training spaces are far away from the coast.

The MT-X's maneuverability will be superior to that of the F-86F known as a leading postwar fighter. The ASDF is considering using the highly maneuverable new trainers for an acrobatic team in the future.

Although the MT-X will not be used for combat training initially, its wing and fuselage will be designed to enable such training. Optional components for combat training include the gun pod, the bomb and missile launcher, the bomb rack, and the head-up display linked to the fire control system.

The head-up display was included in MT-X proposals of KHI, MHI, and FHI. But whether to install the display in the development phase is uncertain because cost control is given priority.

Apart from the combat training mission, the MT-X is planned to engage in not only basic pilot training, but also other missions such as; liaison flights, training support (target towing and electronic countermeasure training), collection of radioactive dust, high-altitude meteorological observation, TPC training, GAT check, flight check, and acrobatic flights. Therefore, five points of the MT-X airframe are designed to accommodate towed targets, and various pods for ECM systems, chaff dispensers, GAT check equipment, meteorological observation systems and dust collectors. Two 150-galon drop tanks can also be mounted on the aircraft.

The JDA is expected to purchase about 200 MT-X trainers to cover all of these multiple missions.

CSO: 4120/15

IHI EAGER TO GET XF-3 ADOPTED FOR MT-X

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 3,4

[Text]

Ishikawajima-Harima Heavy Industries Co. (IHI) has strengthened its setup for the development of the XF-3 small turbofan engine to get the engine adopted for the ASDF MT-X new-generation intermediate trainer because the JDA has officially selected MT-X airframe contractors with basic design work funded under the FY 1981 budget.

It is now proceeding with fabrication of five XF-3-30 prototypes for various tests under a contract with the JDA's Technical R&D Institute (TR&DI). The fabrication work has been speeded up prior to delivery of the first of the five prototypes to the TR&DI in October.

The JDA is expected to select the MT-X engine by the autumn of 1982. Besides the XF-3, some foreign engines such as the Larzac, are considered as condidates.

The TR&DI/IHI XF-3 project started in FY 1977 with fabrication of the XF-3-1 and -20 prototypes. IHI intends to make utmost efforts to make the XF-3 meet the MT-X engine requirements so that it will be adopted for the new trainer.

CSO: 4120/15

TR&DI ENDS INITIAL TESTS ON SCOUT/WARNING APC

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 7,8

[Text]

The Technical R&D Institute (TR&DI) of the JDA has completed initial tests on the scout/warning wheeled armored personnel carrier (APC) for the GSDF, confirming almost all performance requirements for the new vehicle have been met.

In the next phase of the scout/warning APC development program, the GSDF will prepare details of an operation scheme for the new vehicle and study a 20mm machine gun to be mounted on it prior to the TR&DI's fabrication of a full system and the JDA's service entry certification. As for the full-scale fabrication, the TR&DI had sought funding in FY 1982. But the JDA has turned down this request with priority attached to development of a new main battle tank and a new antiaircraft gun.

The TR&DI has been engaged in development of the command/communications wheeled APC as well as the scout/warning vehicle. The same chassis is used for the two wheeled APCs. The command communications APC has been prepared for deployment starting in FY 1982.

Specifications of the scout/warning APC under development follow: Weight: about 13.95 tons. Length: about 5.37 meters. Width: about 2.48 meters. Height: about 2.48 meters. Maximum speed: about 100 kilometers per hour. Chassis structure: three axes and six wheels. Weapons systems: a 20mm machine gun and a 7.62 machine gun. Crew: five men. Powerplant: 300-horsepower four-cycle water-cooled diesel engine.

CSO: 4120/15

FULL-SCALE AW-X DEVELOPMENT TO BE LAUNCHED IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 p 8

[Text]

The TR&DI has set aside ¥5,460 million in its FY 1982 budget request for starting full-scale fabrication of the AW-X new antiaircraft machine gun for the GSDF in the fiscal year.

The AW-X, consisting of the Model 74 tank chassis and the Swiss Oerlikon 35mm KDE gun, will be used for air defense of GSDF divisions along with short-range and portable surface-to-air missiles.

The AW-X research and development program started in FY 1978. So far, the TR&DI has fabricated the fire control system and experimentally mounted the 35mm gun on the Model 61 tank chassis. But the Model 61 tank chassis was found to have problems regarding mobility, load capacity and other aspects. This led to the adoption of the Model 74 tank chassis.

The TR&DI intend to complete the AW-X development by FY 1987, although coordination would be necessary between the AW-X and new tank development programs. The GSDF plans to purchase a total of 120 AW-X guns.

CSO: 4120/15

¥86,700 MILLION REQUESTED FOR SPACE DEVELOPMENT IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 8, 9

[Text]

The Science & Technology Agency has drafted its FY 1982 budget request totaling ¥368,270 million, up 4.5 percent over FY 1981, including ¥86,780 million for space development and ¥9,433 million for aircraft research and development. The request also calls for ¥139,187 million in disbursement from FY 1983 on.

Of the space development funds, the agency earmarks ¥33,984 million for development and launching of satellites, ¥35,565 million for development of satellite launching rockets and ¥1,326 million for research into space development technology. It notes in the budget request that Japan should promote development of rockets, as well as satellites, for meteorological observation, maritime observation, earth resources exploration, communications, broadcasting and other uses. Most of the space development funds will be allocated to the National Space Development Agency (NASDA).

The aircraft research and development funds include ¥6,239 million for the development of a low-noise short take-off and landing (STOL) aircraft which could become a mainstary airliner for future local aviation. In FY 1982, the agency's National Aerospace Laboratory plans to go ahead with fabrication of an experimental STOL aircraft, a flight simulator, and other necessary equipment.

The agency also requests ¥5,531 million in disbursement from FY 1983 on, for the STOL program. The experimental aircraft will be completed in FY 1983.

CSO: 4120/15

PARTNER FOR Y-XX PROGRAM TO BE SELECTED BY NOVEMBER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 pp 1-3

[Text]

The Japanese aircraft industry intends to select a foreign partner for the development of the Y-XX 150-seat commercial transport by the end of November.

The Y-XX special committee of the Society of Japanese Aerospace Companies has set up a working group, headed by Hirokatsu Isshiki, Manager of Mitsubishi Heavy Industries Ltd.'s Third Aircraft Division. The committee will prepare a concrete policy on the international Y-XX development for final negotiations, starting in October, with candidates for the partner prior to the selection. Among the candidates, the Boeing Co. and the Fokker/McDonnell Douglas Corp. (MDC) group have proposed specific aircraft development programs for Japan's Y-XX project. Airbus Industrie, another candidate, is also expected to make a specific proposal for joint development, with Japan, of the A320 as the Y-XX project quite soon.

The partner selection schedule was decided at a top-level meeting of the industry in early September. The schedule also calls on the industry to consult with the Ministry of International Trade and Industry (MITI) on concrete policy and to study the world's aircraft market trends before the selection.

The industry has set the selection deadline for the end of November, apparently in consideration of intra-government negotiations on the FY 1982 (April 1982-March 1983) budget, which is expected to fund subsidies for the Y-XX program. But the selection could be delayed beyond the deadline, depending on the timing of Airbus Industrie's presentation of a specific proposal.

Japanese industry has so far put forward a tentative policy on the international aircraft development program at preliminary negotiations with the candidates. It is now essential to set a concrete policy on the basis of Boeing's 7-7 and the Fokker-MDC group's MDF-100 programs proposed in August.

Aircraft sections which the Japanese want to develop in the international program are a key point of the policy. Although the Japanese have undertaken development of fuselage sections in the Japan-Boeing-Italy 767 (Y-X) program, they are eager to take charge of the main wing in the Y-XX program under a long-term strategy to penetrate the world's aircraft market on a full-scale basis. The Fokker-MDC group has invited the Japanese to take charge of the MDF-100's main wing, excluding the center wing box, flap and aileron, while Boeing has indicated its readiness to accept Japanese development of the 7-7's main wing. If the Japanese successfully take charge of the main wing, it would be easy for the industry to receive subsidies for the program from the government, which favors early advancement of the industry.

However, some industry quarters have noted that the Japanese would have to make massive investments in plant and equipment to take charge of the main wing, increasing their financial risks in the program. These quarters have recommended that the Japanese make effective use of existing technologies and equipment for the 767 program to minimize new investments. In that case, whether the government would appropriate subsidies would be a problem. The industry considers the subsidies as indispensable for the Y-XX program, estimated to cost ¥300,000 million. The subsidy matter would eventually depend on the industry's negotiations with MITI.

Another key factor in the policy on the Y-XX program is how much of a share the Japanese should seek in the joint program. This is an important matter because the Japanese are to take part in sales and product support activities as well as the development phase.

CSO: 4120/18

SJAC TO SET UP THREE AD HOC COMMITTEES

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 p 3

[Text]

The Society of Japanese Aerospace Companies has decided to set up three ad hoc survey committees on commuter aircraft, the Japanese aerospace industry's computer utilization, and the space industry. All these three committees will prepare survey reports on these subjects by the end of the current fiscal year in March 1982.

The commuter aircraft committee will study the world's current commuter aircraft market, the Japanese market, their potential for future development, and the Japanese industry's policy on such aircraft.

The computer utilization committee will conduct a survey on the Japanese aerospace industry's future promotion of computer uses. Specific survey subjects are computer utilization in the European and American aerospace industries, the current conditions and problems of the Japanese industry's computer utilization, the Japanese industry's demand for computers and computer technology development, and how best to utilize computers in the Japanese industry in the 1990s.

The space industry committee will look into the Japanese space industry's international competitiveness to project the future market for the industry. Specific survey items include production and marketing of space equipment and parts in Japan and other industrial countries, exports and imports of such products in foreign countries, the Japanese space industry's strategy on production of these products, and the Japanese industry's FY 1981 performance.

CSO: 4120/18

SCIENCE AND TECHNOLOGY

MT-X DEVELOPMENT SCHEDULE GIVEN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 pp 8-10

[Text]

The Japanese aircraft industry will launch development of the MT-X new intermediate trainer aircraft for the ASDF, with work on the basic design starting in October.

At the end of the basic design work phase in October or November 1982, an avionics configuration will be determined, with selection of individual avionics systems, including the head-up display.

The basic design work will be followed by work on the detailed design, ending in March 1984. Fabrication of prototypes will start in FY 1983. The first prototype will be completed in the latter half of FY 1984 for flight tests beginning in the first half of FY 1985. Completion of the MT-X development work is expected by the end of FY 1987.

Details of the projected MT-X development schedule follow:

October 1981-October 1982: Work on the basic design of aerodynamic characteristics, structure and configuration for examination in March 1983.

October 1981-March 1983: Tests related to the basic design.

July 1982-March 1984: Tests related to the detailed design.

April 1982-March 1983: design, fabrication and tests of a full-size mockup.

April 1983-March 1986: Tests of prototypes.

October 1981-March 1984: Release of scheme drawings, to to start in October 1982, and release of manufacture drawings in April 1983.

October 1981-October 1982: Preparation of material supply plans and implementation of initial work plans.

October 1982-March 1983: Preparation for ordering materials from April 1983 to November 1984.

April 1983-February 1985: Fabrication and delivery of 16 engines for flight tests and four reserve engines.

April 1983-November 1984: Design and manufacture of machine tools.

June 1983-February 1985: Manufacture of the first and second lot components.

December 1983-October 1984: Assembly of the 01 preliminary prototype for static fatigue tests from October 1984 to November 1986.

March 1984-February 1985: Assembly of the second prototype for ground tests in April-July 1985 and flight tests in July 1985-January 1986 before delivery.

August 1984-June 1985: Assembly of the third prototype for ground tests in June-August 1985 and flight tests in August 1985-February 1986 before delivery.

October 1984-July 1985: Assembly of the fourth prototype for ground tests in July-September 1985 and flight tests in September 1985-March 1986 before delivery.

December 1984-July 1985: Assembly of the 02 preliminary prototype to conduct fatigue tests in July 1985-October 1987.

November 1985-March 1988: Technical and operational tests of the four prototypes.

CSO: 4120/18

MILITARY

DEFENSE MAY ACHIEVE 63.9 PERCENT OF AIRCRAFT FUNDING TARGET BY FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 2-4

[Text]

The Japanese Defense Agency (JDA) could achieve 63.9 percent of its aircraft funding target stipulated in the FY 1980-84 Medium-Term Defense Program (MTDP) by FY 1982, if the 136 aircraft are approved in the next fiscal year as requested. The Ground Self-Defense Force (GSDF) could achieve 53.8 percent, the Maritime Self-Defense Force (MSDF) 50.7 percent and the Air Self-Defense Force (ASDF) 83.6 percent.

A breakdown of the MTDP aircraft funding target, FY 1980-81 funding and FY 1982 request is as follows:

	MTDP target (A)	FY '80 funding	FY '81 funding	FY '82 request	sub total (B)	Target achievement ratio (B)/(A)	Remainder (A)-(B)
GSDF							
AH-1S	22	-	-	22	22	100%	0
OH-6D	55	10	8	6	24	43.6	31
HU-1H	42	5	5	7	17	40.4	25
V-107	1	1	-	-	1	100.0	0
CH-X	2	-	-	-	-	-	2
LR-1	6	2	1	1	4	66.6	2
TL-1	2	2	-	-	2	100.0	0
sub total	130	20	14	36	70	53.8	60

	NTDP target (A)	FY '80 funding	FY '81 funding	FY '82 request	sub total (B)	Target achievement ratio (B)/(A)	Remainder (A)-(B)
MSDF							
P-3C	37	10	-	17	27	72.9%	10
US-1	2	1	-	-	1	50.0	1
TC-90	16	2	4	3	9	56.2	7
KM-2	4	-	1	2	3	75.0	1
Training support aircraft	3	-	-	-	-	-	3
HSS-2B	46	2	6	11	19	41.3	27
SH-X	2	-	-	-	-	-	2
RH-X	6	-	-	-	-	-	6
S-61A	8	0	1	4	5	62.5	3
OH-6D	6	-	-	2	2	33.3	4
sub total	130	15	12	39	66	50.7	64
ASDF							
F-15J/DJ	77	34	-	43	77	100.0	0
F-1	13	3	2	3	8	61.5	5
E-2C	4	-	4	-	4	100.0	0
C-130H	12	-	2	4	6	50.0	6
T-2	23	4	6	7	17	73.9	6
T-3	6	6	-	-	6	100.0	0
MU-2	5	1	1	2	4	80.0	1
V-107A	6	2	2	2	6	100.0	0
H-X	7	-	-	-	-	-	7
sub total	153	50	17	61	128	83.6	25
Total	413	85	43	136	264	83.9	149

CSO: 4220/16

MSDF SHIPBUILDING PROGRAMS REPORTED

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 pp 5-7

[Text]

The MSDF has requested funding of four 2,900-ton DD destroyers and one 1,400-ton DE escort destroyer as well as other ships in FY 1982 to achieve 68.8 percent of its 16-destroyer funding target fixed in the FY 1980-84 MTDP.

The target consists of two 4,500-ton DDG guided-missile destroyers, 10 2,900-ton DDs and four 1,400-ton DEs. FY 1980-81 funding covered one DDG, four DDs and one DE. If all the requested five are approved in FY 1982, the MSDF would request the remaining five--one DDG, two DDs and as many DEs--in FY 1983 to accomplish the target one year ahead of schedule.

The MSDF plans to build DDGs and DDs for four escort flotillas. The two DDGs in the FY 1980-84 MTDP are designed for the third flotilla and 10 DDs for the second and third ones. DEs will be deployed for regional fleets to replace patrol combatants.

The MSDF has also requested ¥18,773 million for its fleet rehabilitation and modernization (FRAM) program in FY 1982. The funds comprise ¥6,692 million for modification of the 3,000-ton Takatsuki DDA antiair destroyer and purchase of weapons systems for the Kikuzuki of the similar class. The current MTDP visualizes four Takatsuki-class DDAs and two 4,700-ton Haruna-class DDH helicopter-carrying destroyers for the FRAM.

In FY 1981, ¥9,657 million was earmarked for weapons systems to be installed on the modified Takatsuki. Funding of weapons systems usually precedes that of modification work because modification must coincide with acquisition of weapons systems.

Under the FRAM program, the current DASH (drone anti-submarine helicopter) and 5-inch gun on the DDA will be replaced by the Harpoon surface-to-surface missile, Sea Sparrow surface-to-air missile and 20mm CIWS gun. Part of the electronic systems will also be modernized.

A breakdown of the MSDF's shipbuilding and FRAM programs under the FY 1980-84 MTDP is as follows:

Ship-building	MTDP target (A)	FY '80 funding	FY '81 funding	FY '82 request	sub total (B)	Target achievement ratio (B)/(A)	Remainder (A)-(B)
4,500-ton DDG	2	-	1	-	1	50.0%	1
2,900-ton DD	10	2	2	4	8	80.0	2
1,400-ton DE	4	1	-	1	2	50.0	2
sub total	16	3	3	5	11	68.8	5
2,200-ton SS	5	1	1	1	3	60.0	2
440-ton MSC	11	2	2	2	6	54.5	5
250-ton PG	1	-	-	1	1	100.0	0
500-ton LSU	2	-	-	-	-	0.0	2
1,100-ton AGS	2	-	-	1	1	50.0	1
3,600-ton AS	1	-	1	-	1	100.0	0
5,000-ton AOE	1	-	-	-	-	0.0	1
Total	39	6	7	10	23	59.0	16

FRAM	MTDP target (A)	FY '80 funding	FY '81 funding	FY '82 request	sub total (B)	Target achievement ratio (B)/(A)	Remainder (A)-(B)
3,000-ton DDA	4	-	1	1	2	50.0%	2
4,700-ton DDH	2	-	-	-	-	0.0	2
Total	6	-	1	1	2	33.3	4

CSO: 4220/16

MILITARY

ASDF/MCDONNELL DOUGLAS F-4EJ MODERNIZATION PROGRAM OUTLINED

Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 p 4

[Text]

The ASDF has decided to install the Westinghouse APG-66 radar for the F-16 and other new systems on the F-4EJ fighter-interceptor to improve its performance. The Hughes APG-65 for the F-18 had also been studied as a candidate.

All the other new systems, expect the head-up display, will be the same as those for the F-15J. They include: the inertial navigation system, the IFF (identification, friend or foe) system and the rear warning radar.

The ASDF plans to experimentally modify an F-4EJ with these new systems used from FY 1982 to 1983. It has earmarked ¥9,850 million in its FY 1982 budget request for the experimental modification. The modified aircraft will be tested in FY 1984 and 1985 before the final adoption of the new systems.

The service intends to modify 100 F-4EJs or 20 aircraft per year from FY 1986 to 1990.

The modification will modernize the F-4EJ's fire-control system (FCS) with the look-down capability given. It will enable the aircraft to be armed with advanced weapons systems such as the AIM-9L Sidewinder, AIM-7F Sparrow air-to-air missiles and the ASM-1 antiship missile. IFF and rear warning capabilities will also be improved.

CSO: 4220/16

JDA TO STUDY PATRIOT, NIKE PHOENIX AS SAM-X

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 p 4

[Text]

The JDA plans to conduct full-scale study from FY 1982 to 1983 on the U.S. Army/Raytheon Patriot and the Mitsubishi Heavy Industries-proposed Nike Phoenix as condidates for the SAM-X next-generation surface-to-air missile to replace the GSDF Hawk and the ASDF Nike-J.

It wants to start the SAM-X procurement program in FY 1984 on the basis of the study.

It has requested ¥500 million for a survey on the Patriot in FY 1982. In the survey, it will commission the U.S. Army to examine Japan's possible purchasing of the Patriot and conduct a joint study with the Americans on purchasing costs and other matters.

As to the Nike Phoenix, a mixture of the Nike and the Hughes Phoenix air-to-air missile for the U.S. Navy/Grumman F-14 fighter, the JDA's TR&DI will collect up-to-date data on the missile to determine whether it could be adopted as the SAM-X. The JDA has earmarked ¥20 million for the Nike Phoenix study in the FY 1982 budget request.

CSO: 4120/15

GSDF TO ATTACH PRIORITY TO TANKS, GUNS IN NEW MTDP

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 4,5

[Text]

The Ground Self-Defense Force (GSDF) is expected to give purchasing priority to tanks, artillery, and antitank and antiaircraft weapons under the new FY 1983-87 Medium-Term Defense Program (MTDP) to build up its combat capabilities. The new MTDP will be drafted by the end of the current fiscal year, or March 1982.

The priority weapon items include the Model 74 tanks, the Model 75 155mm self-propelled howitzer (HSP), the 203mm HSP, the Model 75 130mm SSR self-propelled multi-barreled rocket launcher, the 155mm towed howitzer, the Model 79 surface-to-surface missile (SSM), the 84mm recoilless gun, the Chu-MAT medium-range antitank missile, the short-range and portable surface-to-air missiles (SAM), and the new AW-X antiaircraft machine gun.

In addition to the weapons systems' purchase, the GSDF intends to reorganize Army divisions to improve their combat readiness.

The GSDF is expected to order 80 Model 74 tanks every year as planned for FY 1982. In that case, it will be able to achieve the authorized target inventory for the Model 74 tanks by FY 1984 or the last year of the current five-year MTDP. Therefore, it is considering raising the target inventory for continued Model 74 purchasing until new tanks enter service around FY 1988.

As for artillery, the GSDF plans to launch purchase of 155mm towed howitzers in the first year of the new MTDP. It intends to order seven for training in the initial year and more in the subsequent years to replace the current 105mm and 155mm howitzers at an annual pace of one artillery unit.

The GSDF plans to purchase 155mm HSPs and 130mm SSRs at the same annual pace as in the current MTDP. On 203mm HSPs, it may aim at organizing 1.5 units under the new MTDP.

Among antitank weapons, Model 79 SSMs may be purchased at an annual rate of eight sets for one unit. The 84mm recoilless gun purchase may be speeded up with domestic license production started. The Chu-MAT antitank missile, now under development, could enter service under the FY 1983-87 MTDP.

As for antiaircraft weapons, the GSDF intends to continue purchase of short-range and portable SAMs under the new MTDP. The AW-X antiaircraft gun, now under development, may be incorporated into the new program. But its service entry is expected to be virtually realized under the FY 1986-90 MTDP.

CSO: 4120/15

JDA TO ORDER 68 WHEELED APC'S BY FY 1984

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 5,6

[Text]

The JDA plans to order 68 command/communications wheeled armored personnel carriers (APC) for the GSDF by FY 1984. It has already requested ¥1,024 million to be approved under the FY 1982 budget for the first 13 units, expecting the remaining 55 units to be funded in FY 1983 and 1984.

It has requested funding of 50 155mm and 19 203mm self-propelled howitzers, as well as the wheeled APCs, in FY 1982 to improve the mobility of GSDF units. The wheeled APCs, with command and communications officers aboard, will act together with these self-propelled guns for highly-mobile operations.

The APCs, priced at slightly less than ¥80 million per unit, will be produced domestically. Komatsu Ltd. is expected to be named the prime contractor for the production, although Mitsubishi Heavy Industries Ltd. is also eyeing the deal.

CSO: 4120/15

KOMATSU LIKELY TO UNDERTAKE 203MM HSP LICENSE PRODUCTION

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 p 6

[Text]

The JDA is expected to name Komatsu Ltd. as prime contractor for license production of the 203mm self-propelled howitzer (HSP) for the GSDF by the end of September. But Mitsubishi Heavy Industries Ltd. (MHI) and Hitachi Ltd. may participate in the production as subcontractors.

The JDA intends to have the 203mm HSP produced by domestic manufacturers, but the gun barrel and engine will be imported from the United States. Although it has nominated Japan Steel Works Ltd. as manufacturer of the turret, it has yet to select the prime contractor for production of the chassis and assembly of the full system. It has requested Komatsu and MHI to submit proposals for the chassis production, though Hitachi as well as the two firms had hoped to undertake the production. Indications are that the JDA wants to have the three companies jointly undertake the production with Komatsu serving as prime contractor.

In the FY 1982 budget request, the JDA has sought 12 203mm HSPs for front-line units after those for training funded in FY 1981.

CSO: 4120/15

MSDF TO ADOPT MK-46 TORPEDO FOR P-3C

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 pp 6,7

[Text]

The MSDF is believed to have decided on the adoption of the U.S. Navy MK-46 short-range torpedo for the P-3C anti-submarine patrol aircraft. It has incorporated funding of the torpedoes into its FY 1982 budget request.

Its negotiations with the United States are now under way on details of Japan's license production of the torpedo. The U.S. Navy has reportedly agreed to release the torpedo for Japan's license production.

The MSDF has been developing the improved version of the Model 73 torpedo for the P-3C because the MK-46's adoption had earlier been seen as difficult.

Irrespective of the MK-46's adoption, the MSDF wants the development of the improved Model 73 to be continued. It could purchase both the MK-46 and the improved Model 73 for the P-3C in the future.

CSO: 4120/15

MILITARY

MSDF TO ACQUIRE FIRST NEW DD DESTROYER IN MARCH 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 539, 23 Sep 81 p 7

[Text]

The Maritime Self-Defense Force (MSDF) will take delivery of the 2,900-ton Hatsuyuki, the first new DD destroyer, in March 1982, which started full-scale test operation in September.

The new DD, the core of a sophisticated escort flotilla, will be equipped with the Sea Sparrow surface-to-air missile and the Harpoon surface-to-surface missile, It will also be equipped with an HSS-2B antisubmarine helicopter. The MSDF plans to form four DD-led sophisticated escort flotillas.

Its powerplant consists of the Rolls-Royce/KHI Olympus TM3B gasturbine engine for boosting and the RM1C Tyne for cruising.

The first all-gasturbine Japanese warship, Hatsuyuki, built by Sumitomo Heavy Industries Ltd., has smoothly run in the past tests as expected, according to the shipbuilder's interim report.

CSO: 4120/15

MILITARY

U.S. AGREES TO SUPPLY COUNTRY WITH F-15 TECHNICAL DATA

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 pp 3-4

[Text]

The United States has agreed to supply Japan with the McDonnell Douglas F-15 fighter's technical data, excepting radar, and partial overhauling technology for F-15 components not subject to Japan license production.

The agreement came when two officials of the Japanese Air Self-Defense Force (ASDF) negotiated with American officials in the United States from June 14 to July 4 to increase Japan's license production content for the F-15, which the ASDF has already started to introduce as new equipment.

The Americans also approved Japan's license production of some engine parts and auxiliary power units for the aircraft. But they declined to release data on Japanese-requested major components, including the APG-63 radar hardware, for Japan's license production. They have been cautious in expanding foreign countries' license production content for the F-15, which is one of the most sophisticated weapons systems of the United States, although Japan has so far been allowed to produce about one-half of the F-15 components in terms of value.

At the latest license production negotiations, the Japanese asked the Americans to release not only the APG-63 radar hardware but also partial radar software, parts of the ASN-109 inertial navigation system, the IFF (identification, friend or foe) system, the engine air inlet controller, the fuel unit control, the engine electric control, the fuel pump and other components.

The Japan Defense Agency intends to continue the F-15 license production negotiations with the United States in FY 1982 and subsequent years to increase the license production content as much as possible, because it plans to procure about 80 F-15s in addition to the authorized 100 aircraft.

CSO: 4120/18

MILITARY

JDA'S AIRCRAFT ORDERING PROGRAM FOR FY '82

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 pp 4-6

[Text]

The Japan Defense Agency has sought a total of 136 aircraft worth ¥774,646 million for the three services in its FY 1982 budget request.

Funds for three priority types of aircraft are planned for five-year disbursement. These aircraft are the AH-1S antitank helicopter for the Ground Self-Defense Force (GSDF), the P-3C antisubmarine patrol aircraft for the Maritime Self-Defense Force (MSDF).

Funds for the ASDF's F-1 support fighter and T-2 advanced trainer may be disbursed in four years, while those for the MSDF's HSS-2B antisubmarine and S-61A rescue helicopters and the ASDF's C-130H transport may be appropriated in three years.

Planned for two-year disbursement are funds for the GSDF's OH-6D observation helicopter, HU-1H multi-mission helicopter and LR-1 liaison/reconnaissance aircraft; the MSDF's KM-2 trainer, TC-90 instrument flight trainer and OH-6D observation helicopter; and the ASDF's MU-2 search/rescue aircraft and V-107A search/rescue helicopter.

Acquisition schedules for the 136 aircraft follow:

ASDF

F-15J/DJ (43 aircraft worth ¥450,650 million) : Twenty-three DJs) in FY 1985 and 20 in FY 1986. Of the 43 planes, 19 are planned for deployment at fighter-interceptor squadrons. Eleven are reserves for squadrons and the remaining 13 are for replacement of retiring aircraft. The 43 planes are the last installment of the 100 aircraft authorized by the National Defense Council to replace four F-104J squadrons.

F-1 (three aircraft worth ¥6,970 million) : One in FY 1984 and two in FY 1985. All three are reserves to replace retiring aircraft by FY 1985.

C-130H (four aircraft worth ¥22,985 million) : All four in FY 1984. They are the second installment of the 12 aircraft for funding under the FY 1980-84 defense program. Two were funded in FY 1981. The remaining six will be incorporated into an FY 1983 budget request.

T-2 (seven aircraft worth ¥16,498 million) : Five in FY 1984 and two in FY 1985. Of the seven, three are planned for F-1 squadrons and four for reserves to replace retiring aircraft by FY 1985.

MU-2 (two aircraft worth ¥1,062 million) : Both in FY 1983. They are planned for a new rescue squadron to be set up in Akita at the end of FY 1983.

V-107A (two aircraft worth ¥2,757 million) : Both in FY 1983, also planned for the new Akita rescue squadron along with the MU-2s.

GSDF

AH-1S (22 aircraft) : Six in FY 1984 and eight each in FY 1985 and 1986.

OH-6D (six aircraft) : All six in FY 1983.

HU-1H (seven aircraft) : All seven in FY 1983.

LR-1 (one aircraft) : One in FY 1983.

MSDF

P-3C (17 aircraft) : Seven in FY 1985 and 10 in FY 1986.

KM-2 (two aircraft) : Both in FY 1983.

TC-90 (three aircraft) : All three in FY 1983.

HSS-2B (11 aircraft) : All 11 in FY 1984.

S-61A (four aircraft) : All four in FY 1984.

OH-6D (two aircraft) : Both in FY 1983.

CSO: 4120/18

ASDF REQUESTS SECOND F-15 SIMULATOR

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 pp 6-7

[Text]

The ASDF seeks a second F-15 flight simulator worth some ¥5,000 million in its FY 1982 budget request. The first simulator, funded in FY 1979, is now under construction by Mitsubishi Precision Co. for delivery in March 1982. The firm has been licensed by Goodyear Aerospace Corp. to produce the F-15 simulator.

The ASDF plans to procure three F-15 simulators to cover three ASDF bases to be equipped with a total of 100 F-15J/DJ fighter-interceptors. The first simulator is bound for Nyutabaru Base and the second for Chitose Base.

The service intends to procure F-15J/DJ aircraft beyond the authorized 100 planes. In that case, one more simulator could be purchased with another ASDF base named to accommodate F-15Js/DJs.

The ASDF also plans to acquire a flight simulator for the Lockheed C-130H tactical transport because the first two of these aircraft have been funded under the FY 1981 budget. It has earmarked ¥380 million in the FY 1982 budget request for design work on the simulator. Funds for manufacture may be incorporated into a FY 1983 budget request for acquisition at the end of FY 1984.

The C-130H simulator is also expected to be built by Mitsubishi Precision, which already has a technical cooperation contract with Singer General Precision, the original manufacturer of the C-130H simulator.

CSO: 4120/18

MILITARY

JDA TO ADOPT PATRIOT AS SAM-X BY FY '83

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 p 7

[Text]

The JDA is expected to adopt the U.S. Army/Raytheon Patriot by FY 1983 as the next-generation SAM-X surface-to-air missile system to replace the ASDF Nike-J and the GSDF Hawk, although it has sought funds for studies on the Nike-Phoenix, another SAM-X candidate, as well as the Patriot.

The survey on the Nike-Phoenix, proposed by Mitsubishi Heavy Industries Ltd., is likely to deny the advisability of its adoption. The JDA's internal bureaus as well as the ASDF and the GSDF favor the Patriot, according to informed sources.

Before the final adoption of the Patriot, the two services will conduct a joint survey on the missile system with the Americans, and commission them to prepare a possible Patriot procurement program. While advancing the survey, the ASDF plans to extend the service life of the outmoded Nike-J and the GSDF to replace the basic Hawk with the improved model. The SAM-X procurement program is expected to start in FY 1984 or thereafter.

CSO: 4120/18

ASDF PICKS KAISER'S HUD FOR F-4EJ

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 p 7

[Text]

The ASDF has selected Kaiser's head-up display (HUD) for installment on the improved F-4EJ fighter-interceptor.

The ASDF, which plans to modify the F-4EJ by meantimes the HUD and other advanced components, had considered Kaiser's HUD and McDonnell Douglas's system for the F-15 fighter as F-4EJ HUD candidates. It eventually decided to adopt the Kaiser HUD, mainly in view of cost performance and weight. The ASDF wants Shimadzu Corp. of Japan to modify the Kaiser HUD before installment on the improved F-4EJ.

Shimadzu previously developed an over-hang type HUD for Japan's planned experimental short takeoff and landing aircraft on the basis of Kaiser's product. It has also been producing HUDs for F-15J fighter-interceptors under license by McDonnell Douglas.

CSO: 4120/18

TWO HELICOPTERS AS V-107 REPLACEMENTS SET

Tokyo JPE AVIATION REPORT-WEEKLY in English No 540, 30 Sep 81 p 8

[Text]

The three SDF services are expected to adopt different types of large helicopters as replacements for the current V-107s supplied by Kawasaki Heavy Industries Ltd.

Although the three services plan to start funding for new large helicopters simultaneously in FY 1983 under the FY 1980-84 Medium-Term Defense Program (MTDP), the JDA's internal bureaus may fail to unify their new helicopters into a single model because of their different operational requirements.

The MSDF may select the MH-53E, a minesweeping version of the Sikorsky CH-53E, as the replacement for the V-107 mine-sweeping helicopter, while the GSDF and ASDF may adopt the Boeing Vertol CH-47 series for replacement of the V-107 transport helicopter.

The MSDF is expected to procure six to 12 MH-53Es to improve its mine-sweeping capability. The GSDF's CH-47 procurement could total 40 to 50 aircraft. The first two, for training, are planned for funding under the FY 1980-84 MTDP. The ASDF may procure 10 CH-47s.

CSO: 4120/18

BRIEFS

16 VADS AA GUNS--The ASDF has requested funding of 16 20mm Vulcan Air Defense System (VADS) antiaircraft guns in FY 1982, although it has yet to complete operational evaluation of three VADS units funded in FY 1979. The VADS, which will be domestically produced under license for full-scale purchase starting in the next fiscal year, is designed to improve antiair defense capabilities of ASDF bases together with the Tan-SAM Short-range and portable surface-to-air missiles. The ASDF is also considering the 20mm Vulcan machine gun system aboard the retiring F-104J fighter as an antiaircraft gun system for air bases. Experimental modification of the 20mm Vulcan for ground use has been funded under FY 1981 budget. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 p 5]

SH-X PROJECT--The MSDF intends to launch a project for obtaining the SH-X next-generation antisubmarine warfare (ASW) helicopter in FY 1983, although the SH-X project could be reconsidered as part of the FY 1983-87 Medium-Term Defense Program (MTDP) to be prepared next year. The service had planned to start the project in FY 1982 with the ordering of two green aircraft of the Sikorsky SH-60B as an SH-X candidate. However, it has given up requesting funding of them in FY 1982 because funding priority has been given to the P-3C fixed-wing ASW aircraft, the HSS-2B ASW helicopter, and ships. It would be easier for the MSDF to request the green SH-60Bs in the absence of P-3C funding in FY 1983. But the service would have to further consider the necessity of the SH-X project before the request. The SH-X is planned to replace the HSS-2B starting from the late 1980s. According to the MSDF's own configuration, the green aircraft may be modified and mounted with electronic systems in five to six years. The modified SH-60B may be finally adopted as the SH-X in FY 1987 or 1988. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English No 538, 16 Sep 81 p 7]

CSO: 4120/16

END

JPRS 79375

4 November 1981

Japan Report

No. 137

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79375

4 November 1981

JAPAN REPORT

No. 137

CONTENTS

POLITICAL AND SOCIOLOGICAL

Possibility of Creating 'Coalition Government' Examined
(Kotaro Tawara; JIHYO, Aug 81) 1

SCIENCE AND TECHNOLOGY

Defense Industry Wants Weapons Export Ban Lifted
(TOKI NO KEIZAI, Aug 81) 6

Japanese Aircraft Industry Selecting Foreign Partner for New YX Project
(TOKI NO KEIZAI, Jul 81) 16

Toshiba To Emphasize R & D in Electronics, Energy
(SANGYO TO KEIZAI, Aug 81) 20

Mitsubishi Electric Activities in Electronics Field Noted
(SANGYO TO KEIZAI, Sep 81) 30

Business Difficulties of Petroleum Industry Analyzed
(TOKI NO KEIZAI, Jul 81) 36

Gap in Performance
Industrywide Reorganization

Problems of Caustic Soda Industry in Conversion Discussed
(KEIZAI TENBO, 1 Sep 81) 49

POSSIBILITY OF CREATING 'COALITION GOVERNMENT' EXAMINED

Tokyo JIHYO in Japanese Aug 81 pp 100-103

[Article by Kotaro Tawara, critic on political affairs; "'Unifying the Moderates' Concept on Coalition Government Indecisive"]

[Text] Once Again, Democratic Socialist Party's Concept of New Political Party

In spite of the fact that the "coalition era" was completely laid to rest by the double general election in 1980, within the middle-of-the-road political parties it seems the tendency to pursue the unfulfilled dream has not yet changed. Now an "ad balloon" for unification of the centrist parties in the Diet has been launched in spite of bitter experiences.

As usual, the one initiating the idea is the Democratic Socialist Party (DSP). The DSP, Komeito and New Liberal Club will unite and form one faction in the Diet, and as a first step will work as a unified body in the Diet. With this as the scaffolding, they aim in the direction of gradually uniting systematically. DSP Chairman Sasaki and former Chairman Kasuga have said they want to implement this in the extraordinary session of the Diet on reform this fall; and they have begun negotiating with the leadership of the other parties. But opposing views are said to be firmly rooted within the DSP leadership, starting with Chief Secretary Tsukamoto. And as may be expected, the Komeito and New Liberal Club will not easily follow suit. Only Diet member Den and Chief Secretary Narazaki of the Shaminren are positive. And it seems that some young members, such as Satsuki Eda and Naoto Suga, are not necessarily following suit.

Such reaction is natural. Naturally, in various meetings of the members making up the so-called unified faction, including those in the DSP and Shaminren, there exist reasons and consideration why they cannot accept such an idea now. Despite this, it must be said that it is most outrageous that veterans Sasaki and Kasuga, who should have had their eyes opened to moderation, are launching this extremely stale ad balloon as usual.

Indeed, it seems Sasaki's and Kasuga's ideas do not necessarily coincide. Sasaki, who was active as a representative of the "Shakomin Men" (men of the Socialist, Komei and Democratic Socialist parties) for 10 years with both

Saburo Eda and Junya Yano, has a deep personal desire to set up a "shakomin" new party; moreover, this has become his mission as a politician. Consequently, rather than being a matter of whether the view of a coalition era will miscarry because of the election, the Diet's judgment, instead, the more the format of various separate parties forming a "coalition" breaks down, the more there will be a repitition of trial and error due to the burning desire for a new party.

Then, as for Sasaki, who was originally a pro-communist, right-wing Densan official, is from a small faction in the Upper House and has little connection with the LSP, it is said he can hardly consider holding hands with some of the LDP. It is his honest intent to gather together large numbers of socialist members, and plan the total concentration of socialist, komei and democratic socialist power.

Is A Two Conservative Party Reorganization The Aim

On the other hand, Kasuga does not altogether trust the Komeito and has strong feelings of rejection for the left wing of the Socialist Party. On the other hand, because he is a long time veteran of Diet countermeasures, he has a pipeline into the LDP; lately in particular, he has strong connections with various factions within the LDP, such as the Fukuda faction and the Nakagawa faction because of the issue of friendly relations with Korea.

Consequently, it is said that Kasuga's idea is to aim at political power by setting up a new party on the basis of the DSP's status and strength whereby it can take the leadership, merging first the DSP and various factions of the JSP, and then adding the New Liberal Club and the Shaminren. And after establishing a position as the number two power in the political world by pulling ahead of the total of the socialists and communists, he would take measures for dismemberment of the LDP by uniting forces with the anti-Tanaka forces who split from the LDP.

If anything, it may be said that within the framework of his tentative reform of the opposition parties, Sasaki's move to consider cooperation with the LDP left-wingers, such as the Takeo Miki faction, and Kasuga's concept of aiming for political power all at once by making bold to work in concert with the LDP's extreme right are similar programs only at the outset; actually they are diametrically opposed programs. Saying this is a kind of whitewashing. There is the opinion that the relationship between the two men is quite muddy.

In short, in order for Sasaki, who finds it hard to fight an election with the scarce allied organizations and individual votes in the Hyogo fifth district, Japan's most unpopulated area, to be elected, he can by no means give a cold shoulder to the Komeito. Because of that, he cannot help but rely on the "shakomin" concept. On the other hand, Kasuga, who has an undesireable yet unseverable relationship with the Fukuda faction and the Nakagawa faction in many forms besides the political, is now carrying out the role of one chessman in the conservative factional strife; and it is said that his aim is the reorganization of the political order by making the organization of two conservative parties the axix rather than the reorganization of the opposition parties.

However, aside from whether these opinions are on target or not, the various parties that are the subjects of unification by both Sasaki and Kasuga cannot help but consider these elements; and it cannot be denied that these have become primary factors about which the various parties think twice.

Third Road To Be Considered

Moreover, from the very fact that the DSP has joined two organizations, a union and the federation of new religions, it is difficult for it to move easily into the unified faction. Needless to say, the union is a cooperative union between labor and management which has private labor unions as its nucleus. It is said that in a low growth economy, the idea has appeared among some of the Diet members who depend on the union that rather than betting on a reorganization of the opposition parties, a liaison with the dove faction, the sensible faction of the LDP, should be deepened and the objective should be a new type of conservative party which can be supported by the labor unions. They are advocating that a search should be made for a road where the party name discards the "socialist" in Democratic Socialist Party and is changed to Democratic Party, the concept of "shakomin" (socialist, komei and democratic socialist) is discarded, and after joining with the New Liberal Club, they participate in the political party the LDP leads. They are trying to take a third road which differs from that of Sasaki and Kasuga.

Likewise, Chief Secretary Tsukamoto and Keigo Ouchi, who make the federation of new religions their foundation, having joined the anti-Soka Gakkai position of Rissho Koseikai which constitutes the nucleus of the federation of new religions, are opposed to deepening the cooperative relationship with the Komeito. This also is deep-rooted. Even though it is a reorganization drama led by the DSP, it cannot be said there is unity even within the DSP.

On the other hand, the Komeito, New Liberal Club and Shaminren which are in a position of receiving an invitation are all quite complex. The Komeito has the socially unethical problems of the Soka Gakkai and Taisaku Ikeda scandals, and cannot help but make its prime objective the prevention of these from becoming a political issue, and cannot help but give a logical explanation of its every action on this one point. Consequently, if the Komeito/Soka Gakkai leadership could be definitely guaranteed, their secret intent is to agree to the new party and united faction which would increase their right to speak. But conversely, if it cannot be guaranteed, they absolutely cannot join such a movement.

The Komeito would be swallowed up by a new party which is based on the hegemony of the anti-Soka Gakkai federation of new religions, and if it joins the new party which politically pursues the Soka Gakkai scandals, the Komeito would naturally have to leave the new party and if that happened, it would be exposed even more than now to criticism that it is hiding its "scandals." So the Komeito has calculated it would be better not to pick up the chestnuts from the fire but wait for the storm to pass in its present system.

Unified Faction Concept Pernicious

From the Komeito's standpoint, it is natural for it to look with extreme caution on the DSP, which is strongly influenced by the federation of new religions and, as a matter of fact, on the Nakagawa faction which stands at the forefront in the pursuit of the Soka Gakkai's scandal, and to hesitate to join forces with them. Now when the Komeito has declined in the double election, the party's position of not agreeing to a party dissolution and to a union in which it would not be given complete leadership is expressed even in its reaction of wanting to wrestle with this question after recovering its strength in the next election.

In addition, the fact that Takeiri and Yano, executive officals, have already been around a long time and are facing a period of reform, is also a primary factor in avoiding a major change at this time.

In the New Liberal Club, the confrontation between the line of a centrist inclination having its nucleus in the so-called Kono Family---Yohei Kono, Seiichi Tagawa and others---and the line considering a return to the LDP has continued since the party's founding. Moreover, Takeo Nishioka and others have broken with the Kono Family and returned to the LDP. Now the gulf between Yoshio Yamaguchi's group and the Kono Family is deep, and even though Kono tried to change either to the new party concept or the unified faction concept this year, it is said that those within the party have not reached agreement.

In addition, there is absolutely no possibility that the New Liberal Club will align itself with the tie-up with the Fukuda faction and Nakagawa faction which Ikko Kasuga envisions; it is the same even for the Kono Family.

In the Shaminren, those who were formerly active and prominent in the JSP, Den, Narazaki and others, seem to be in a hurry to escape somehow the misery of being the minority party and to set up a large family in any way possible. But many do not necessarily agree with this. It is said that Eda, Suga and Yutaka Hata have strated thinking seriously about returning to the JSP. Since it is strange for the Shaminren, which is clearly in conflict with the DSP and closer to the JSP in Japan's two major points of contention, nuclear power and security, to join the assertions of theDSP and give consideration to a reorganization of the political world, Eda's idea is by far more logical. Den's "wish to be prominent" will only divide the organization if he drives recklessly in trying to grab onto the opportunity to speak.

When this is looked at, it clearly seems the concept of a moderate unified faction does not have even a glimpse of possibility, that is to say, it will be nothing but an ad balloon filled with gas. Besides Sasaki and Kasuga, there is no one who takes it seriously except for some rash, young newspaper reporters.

Moreover, the fact that this "concept" continues to dazzle excites various parties, including the LDP, and is connected also to the development of a trend of trying not to make another vigorous attack against the Komeito considering when there can, by some rare accident, be a unified faction.

It is a problem if a solution of the Soka Gakkai's many scandals of fraudulent investments, wiretapping and perjury which make a frontal challenge to democracy is more or less prevented by such actions, but that aim alone is succeeding somehome or other.

The "concept" of a moderate unified faction which cannot help but become something more than a fig leaf covering the Soka Gakkai's scandals, has now become something pernicious.

9400
CSO: 4105/270

DEFENSE INDUSTRY WANTS WEAPONS EXPORT BAN LIFTED

Tokyo TOKI NO KEIZAI in Japanese No 299, Aug 81 pp 94-99

[Article: Tremendous Ambition of Japan's Defense Industry Awaiting the Lifting of the Weapons Export Ban; Facts on Japanese Industries, 'Dreadful Shadow Figure' With Potentially the World's Mightiest Competitive Power"]

> [Text] A stupendous chorus in the financial world has begun advocating the lifting of the export ban on weapons. Behind this action lies the ambition of the Japanese industries which flatter themselves as being the "world's mightiest competitive power," betting upon weapons as the last large export commodity.

Financial World Betting on the "Last Export Commodity"

A tug of war known as the Japan-U.S. defense talks is being played out while Japan is well aware of the disparity between Japan, which is striving for defensive military power within its territory, the islands of Japan, and the United States, which is scheming to strengthen its military power in the Far East, in accordance with its world strategic plan.

In the midst of all this, the Defense Production Committee of the Federation of Economic Organizations is about to make a recommendation: "a Japan-U.S. Joint Weapons Development Idea."

Of course, as long as it is presented as an idea, the proposal is within the realm of an idea, and it is not of a nature to take shape and form at the moment. However, in all candor, there is a dreadful intention hidden behind this Japan-U.S. Joint Weapon Development Idea.

That is, the proposal includes the concept that Japan, with the world's precision machines and electronics technology, will be in charge of electronics parts production and bring the products to U.S. munitions factories for assembly of the latest weapons, such as precision guided missiles and cruise missiles, for use in Japan and the United States.

In short, it is a suggestion that Japan export unassembled parts of the latest weapons and in return the United States will be responsible for the assembly of the finished weapons to be used by the two countries as military equipment. In other words, the proposal may have an underlying motive woven into the fabric: an invitation to develop the latest weapons jointly in the future to get around the impasse of the weapons export ban policy.

As everyone knows, there is a heavy "foot chain" called the weapons export ban in Japan.

During the Sato cabinet, the "Three Principles for the Export Ban" were established, banning the export of weapons to the communist bloc, to nations to which the United Nations bans such export, and to nations engaged in disputes or suspected of entering into a dispute. Furthermore, in March 1976, under the administration of the Miki cabinet a total export ban system was enforced, banning the export of weapons even to areas other than the target areas listed in the "Three Principles for the Export Ban."

Naturally, in these circumstances, the Japanese defense industry cannot make a move even if it wants to. Thus, the Defense Production Committee of the Federation of Economic Organizations, which might well be called the Vatican of the defense industry, has improvised this "paradoxical plan," the joint development idea, and is trying to break the back of the weapons export ban policy using this as momentum.

Such movements in the financial world have often made their presence felt in the past. The defense industry and some financiers persistently opposed the export ban policy during the Sato and Miki cabinet periods, but they were driven back each time they tried to change the policy.

It was after the aggressive attack on Afghanistan by the Soviet Union that the opposition finally started to show spectacular moves, as if it had won a "civil right." Prime Minister Suzuki's proposal for the establishment of a national integral security council and the priority for increased defense expenditure in the FY-81 budget also encouraged the financial world.

In particular, chairman Shigeo Nagano of the Chamber of Commerce and Industry was very much involved in this issue. He appealed three times in 1978 and 1980 (spring and summer) for the lifting of the export ban, citing reasons for exporting weapons to the Middle East oil-producing nations, such as to secure energy and to foster an advanced defense industry to develop technology. His obsession was relentless.

The essential key, the Japan Weapons Industry Association, also maintains: "Strengthening of defense equipment means the autonomous accumulation of the latest technological ability, which functions eventually as a potential inhibitor against aggression by other countries. In addition, this will also affect the progress of civilian machinery and equipment." (Chairman Tomio Tanatsugu of the Japan Weapons Industry Association, vice president of the Toshiba Corporation).

It shows a glimpse of the fervor of the financial world in challenging the taboo.

Weapons Made in Japan Already in Spotlight

The Japan-U.S. Joint Weapons Development Idea may be simply an advertising balloon giving a lift to these speculations of the financial world and the defense industry.

In the background of the proposal is the secret real motive of the defense industry--for instance, this account was leaked by an executive of Mitsubishi Heavy Industries, which can be titled the "mecca of the defense industry": "The largest factor that blocks the development of the defense industry is the export ban policy. Because of this policy, we are forced into the present predicament of being unable to operate a mass production system and the consequent suffering from high costs. Due to this, we are forced to engage in disadvantageous business competition, and as a result, only production under license is left for us, like the F-15 fighter aircraft and P-3C antisubmarine patrol planes. Frankly, Japan, shackled to this cumbersome burden, is impelled to buy expensive defense equipment."

However, this does not mean at all that the Japanese defense industry is far behind the lead of the United States.

For example, let us look at the Model 74 tank of Mitsubishi Heavy Industries, which is known to have been made by integrating the cream of Japan's technology. The year before last, to be exact, when Ezaki, the minister of MITI at that time, was visiting various Middle East nations, he was asked by each nation to "sell" this modern weapon, which indicates the reputation of this tank. Other than this incident, inquiries about this equipment have been coming from every nation. Last fall, for instance, Chrysler of America directly made contact with Mitsubishi Heavy Industries, asking "whether Mitsubishi is interested in joint development of tanks for Korea," which is another proof of the excellence of our tanks.

In the case of the next-generation medium training aircraft (MTX), inquiries are arriving one after another. This plane is still in the stage of heated competition for the order to be received among Mitsubishi Heavy Industries, Fuji Heavy Industries and Kawasaki Heavy Industries. The inquirers are aware of this delicate situation, but still insist on sending for information. Some inquiries are very impatient and request the "export of the planes as soon as the export ban is lifted," although they are well aware of Japan's weapons export ban policy.

Japan's high technology products have made many conquests in the world's markets, from automobiles, ships, electrical machines and appliances, watches and cameras to electronic machinery and equipment. Maybe because of the trust in the high technology represented by these products, they are thinking of opening up a connection with Japan before it is too late.

In fact, the precision machines and electronics technology of Japan are drawing attention because they are recognized as having the world's highest standard.

Furthermore, the current latest weapons would not exist without the electronics industry. As far as that is concerned, Japanese industry has potential competitive power.

To be more precise, guided weapons such as missiles consist of three elements--the sensory element called the sensor, a microcomputer (central control system) and an actuator (operating mechanism). In a nutshell, a sensor which utilizes electromagnetic waves and infrared rays catches the target, and a microcomputer which receives signals from the sensor guides and sends the missile to the target for destruction.

Naturally, all of today's weapons, starting with F-15 fighter aircraft, tanks and war vessels, carry a few or many of these electronic devices. The next-generation automatic air control system, the so-called BADGE X, is an electronic weapon that has integrated the cream of these computer technologies.

Taking a leap in thought, the computerization of tomorrow cannot make any advancement unless the triad of data-processing, office-automation machinery and equipment and communications are well integrated. Even the world's greatest computer firm, IBM, is far behind the Nippon Telegraph and Telephone Public Corporation in the field of communications.

This example is not actually necessary to understand the large lead maintained by Japan's technology is some fields. I am sure you can now picture the potential competitive power held by Japan's technological camp over the latest weapons in demand, when these technologies are put together and put to free use.

The Defense Production Committee of the Federation of Economic Organizations was confident about taking charge of the production of electronic parts in the Japan-U.S. Joint Weapons Development Idea only because of this background.

Last fall, a weapons procurement consultation agency was established between the U.S. Department of Defense and the Bureau of Equipment, Defense Agency. The ultimate purpose of the agency is said to be joint weapons development. If the Defense Industry Committee suggested Japan-U.S. joint weapons development on the assumption of this same idea being entertained by the two governments, we can say that Japan's export of weapons has begun to take shape step by step toward reality.

Defense Industry Advanced to Such a High Level

There is another factor behind the persistent stand of the financial world for lifting the weapons export ban.

Traditionally, the makeup of the defense industry was represented by the heavy industries functioning as a rivet to hold the industry together, namely, Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Fuji Heavy Industries, and by machine manufacturers, namely, Japan Steel Works, Howa Machinery, Daikin Kogyo and Komatsu. However, with the recent remarkable advance of electronics firms, the conventional rank and file of the defense industry is largely being expanded by the participation of Hitachi, Toshiba, Nippon Electric, Mitsubishi Electric, etc.

Picking the land, sea and air defense firms, for your reference, the following is the list of participants.

First, regarding firms related to missiles for the land defense sector, there are 17 contenders: Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Fuji Heavy Industries, Mitsubishi Electric, Toshiba, Nippon Electric, Matsushita Electric Industrial, Japan Radio, Shin Kobe Electric, Ushio Electric, Toyo Tsushin, Daicel, Daikin Kogyo, Tohoku Metal Industries, Nippon Oils and Fats, Nissan Motor and San-ei Instrument (unlisted).

For land defense vehicles and equipment/machinery/materials, there are 11 contenders: Mitsubishi Heavy Industries, Japan Steel Works, Komatsu, Howa Machinery, Hitachi, Nissan Diesel, Hino Motors, Isuzu Motors, Nippon Aluminium, Kawasaki Heavy Industries and Mitsubishi Motors (unlisted).

For land defense fire arms and ammunition such as guns and artillery, bullets and powder, rocket bombs and rocket launchers, there are 13 companies: Howa Machinery, Asahi Seiki, Daikin, Nittoku Metal Industry, Komatus, Nissan Motor, Nippon Oils and Fats, Asahi Chemical Industry, Richo Watch, and three unlisted companies: Nippon Koki, Showa Kinzoku and Chugoku Kayaku.

For the air defense BADGE system (automatic air control system), there are six contenders: Nippon Electric, Nihon Aviatronics, Mitsubishi Electric, Toshiba, Fujitsu and Hitachi. For three-dimensional radars, Mitsubishi Electric and Nippon Electric are named. For MTX jet trainer aircraft, there are four companies: Kawasaki Heavy Industries, Mitsubishi Heavy Industries, Fuji Heavy Industries and Ishikawajima-Harima Heavy Industries. For missiles, there are six candidates: Mitsubishi Heavy Industries, Mitsubishi Electric, Nippon Electric, Japan Aviation Electronics Industry, Daikin and Nissan Motor. For aircraft machinery and equipment, there are 10 companies: Mitsubishi Electric, Toshiba, Nippon Electric, Hokushin Electric Works, Hitachi, Fujitsu, Oki Electric, Kokusai Electric, Japan Radio and Toyo Tsushinki.

Also, for F-15 fighter aircraft, Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Fujitsu Heavy Industries, Shin Meiwa Industry and Japan Aircraft Manufacturing are interested in the airframe, while Ishikawajima-Harima, Mitsubishi Heavy Industries and Kawasaki Heavy Industries are interested in the engine. For airframe materials, Kobe Steel, Sumitomo Light Metal Industries and Daido Tokushuko can be named. For onboard electronic machinery and equipment, 19 companies are counted: Mitsubishi Electric, Toshiba, Nippon Electric, Hokushin Electric Works, Shinko Electric, Tokyo Keiki, Toyo Tsushinki, Shimazu Seisakusho, Japan Aviation Electronics Industry, Hitachi, Nittoku Metal Industry, Daicel, Sumitomo Seimitsu Kogyo, Owari Seiki, Shin Chuo Kogyo, Teijin Seiki, Tokyo Screws, Kayaba Seisakusho and Sakura Rubber.

For antisubmarine P-3C patrol planes, Kawasaki Heavy Industries, Japan Aircraft Manufacturing, Fuji Heavy Industries, Shin Meiwa Industry and Mitsubishi Heavy Industries are interested in the airframe, while Ishikawajima-Harima, Kawasaki Heavy Industries and Mitsubishi Heavy Industries are interested in the engine. For onboard electronic machinery and equipment, there are Toshiba, Mitsubishi Electric, Nippon Electric, Fujitsu, Kokusai Electric, Japan Radio, Shimazu Seisakusho and Sumitomo Seimitsu Kogyo, and Taiyo Radio and Koden Seisakusho from the unlisted companies.

For helicopters, Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Fuji Heavy Industries and Ishikawajima-Harima Heavy Industries are the contenders.

For the sea defense sector naval vessels, there are Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Hitachi Shipbuilding & Engineering, Ishikawajima-Harima, Sumitomo Shipbuilding & Machinery, Sasebo Heavy Industries and Mitsui Shipbuilding & Engineering. For naval vessel machinery and equipment, there is a long list: Mitsubishi Heavy Industries, Kobe Steel, Ishikawa Seisakusho, Japan Steel Works, Mitsubishi Electric, Nippon Electric, Hitachi, Oki Electric, Hokushin Electric, Shimazu Seisakusho, Tokyo Keiki, Nippon Kogaku and Hitachi Shipbuilding & Engineering, and unlisted Minami Kogyo and Watanabe Tekkojo.

Incidentally, picking the firms which had more than a 1-percent share of the Defense Agency contracts for FY-80, the following 13 companies in order of the share are highlighted: 1) Mitsubishi Heavy Industries, 24.6 percent; 2) Ishikawajima-Harima Heavy Industries, 11.4 percent; 3) Kawasaki Heavy Industries, 8.5 percent; 4) Mitsubishi Electric, 7.6 percent; 5) Toshiba, 3.4 percent; 6) Nippon Electric, 2.3 percent; 7) Itochu Aviation, 1.5 percent; 8) Nippon Oil, 1.4 percent; 9) Japan Steel Works, 1.3 percent; 10) Sumitomo Shipbuilding & Machinery, 1.3 percent; 11) Komatsu, 1.3 percent; 12) Hitachi Shipbuilding & Engineering, 1.2 percent; and 13) Tokyo Keiki, 1.0 percent.

As is clear from this, the defense industry connections with the Defense Agency are diverse. These industry groups have steadily achieved results and have built up Japan's defense industry. It is entirely predictable, however, that the breadth of the industry can be further expanded depending upon the future reinforcement of the defense setup.

It is the keenly felt desire of the financial world to see the weapons export ban actually lifted, in order to consolidate the defense industry which has shown a continuous growth.

Actual State of Extremely Clever Weapons Exports

An utterance as if intentionally in unison with the Defense Production Committee has come out of the Electronics Industries Association of Japan, which is rather a new face in the defense industry: "If MITI really means to promote the domestic production of weapons, first it should swallow the comparatively high cost of domestic weapons. Or else, it should permit the export of weapons and give the industry an equal opportunity to compete with overseas makers." (Chairman of the association Sadakazu Shindo, chairman of Mitsubishi Electric).

The lifting of the export ban, the association says, will open the door for free competition, to the extent that Japanese industry will get seriously involved in the business of technology development, and this will make it possible to make a bold investment from the standpoint of exploiting international markets. Naturally, the comparatively high cost of the products due to production under license can be trimmed independently. It is also confident that speedy progress in technology can be facilitated.

The weapons export ban is very much a pain in the neck to the defense industry.

Well, then, is the export of all products that fall in the category of weapons completely banned? It appears there are some points that keep us from making such a general statement. Last March, there was an incident in which American weapons makers headed by Lockheed were on a spree of buying masses of Japanese machine tools. It was obvious to anybody that what they purchased was equipment and machinery for the manufacture of weapons. However, nobody complained about the use of the machine tools exported as a general commodity, and the makers also kept their mouths shut and did not reveal the details of the transactions.

That is still an innocent case. In many cases, trucks, jeeps, helicopters and small vessels bound for Southeast Asia are exported fully for use as weapons. In such cases, however, they use a clever trick--first, private companies purchase these materials from Japanese manufacturers, and then they resell them to the armed forces of the country concerned for use as weapons, and the deals are almost never checked at the export stage.

Vehicles, vessels and helicopters exported from Japan as general commodities can be quickly converted by partial modification into artillery carriages, gun carriages and by fitting rocket launchers into modern weapons ready to fight. The floating dock exported by Ishikawajima-Harima Heavy Industries to the Soviet National Vessel Import Corporation was no exception. It is reported that the dock is serving as a facility to repair the Minsk, a large aircraft carrier of the Soviet Union.

The route used by the U.S. forces resident in Japan is more open. The U.S. Armed Forces in Japan are authorized a free pass to take home weapons made in Japan purchased in accordance with the treaty entitled "provisional special command" based upon the position agreement of the Japan-U.S. Security Treaty. As far as the U.S. Armed Forces are concerned, Japan's total weapons export ban has become meaningless. If it wants to, the United States can freely purchase weapons made in Japan through the invisible cloak of the U.S. Armed Forces resident in Japan.

To hit the nail on the head, it is easy for Japanese firms to pass through the mesh of the export ban by the shady route of the U.S. Armed Forces resident in Japan. As long as the Japan-U.S. Security Treaty is intact, it can be said that it is difficult to safeguard against "loopholes" in the export ban policy.

The actual state of skillful weapons exports is such that there are extraordinary "loopholes" ready to be taken advantage of (?), whether it is the route through the U.S. Armed Forces resident in Japan, or military equipment which is openly and freely handled as a general commodity.

The International Peace Research Institute in Stockholm, which has international prestige, prepares statistical data concerning the purchase of weapons procured by the military of each nation in the world. According to the data, the weapons exports of Japan in 1979 (period of 1 year) was up to $21 million.

Since the weapons export ban policy is what is addressed, the government must undoubtedly check the transactions. The figures shown are obviously all from those which went through the "loopholes" previously described. It is a strange sensation that we feel as if we have found a "conscience" in the people who advocate the repeal of the export ban in spite of the taboo, in the face of this kind of "scuttled policy."

Defense Industry Reserves Pouring In

Admitting that the business groups in various fields are shouldering Japan's defense industry as described before, new faces which can be termed the "defense industry reserves" are pouring in on the heels of the firms on the front line.

Let us first pick up the hidden defense-related firms.

Tokyo Screws, which holds 80 percent of the market shares of the domestic aircraft screws, has already been involved with the F-15 in connection with screws of a titanium alloy. Also, Nippon Miniature Bearing, which will absorb Tokyo Screws in October, is one of the reserves. The company manufactures extremely small bearings for aircraft, and has already made up its mind to join the defense industry as a freshman concurrently with the takeover.

Other companies which draw attention because of their dealings with titanium are Toho Titanium and Osaka Titanium Seizo. Including these two companies, there are as few as six companies in the world that deal with the titanium industry, a typical oligopoly industry, where supply is always behind the demand and shortage of commodities is a permanent setting. Nevertheless, demand for metal titanium is constantly increasing, as this metal is indispensable as a material for bombers and supersonic fighters. It is therefore inevitable that the two companies will tilt toward the defense industry whether or not they want to do so.

Speaking of materials for aircraft, carbon fiber is an element indispensable for weight reduction of an aircraft, and two companies, Toho Rayon and Toray Industries which handle this material, and Nippon Carbon which is the pilot of the carbon fiber, can also be regarded as members of the hidden defense industry reserves.

As for the "star" of weapons, rocket fuels, Nippon Sanso and Teikoku Sanso which manufacture hydrogen are also accountable. At the same time, Iwatani & Co which embraces a subsidiary that manufactures hydrogen cannot be overlooked.

Looking into the field of systems, there is Tokyo Aircraft Instrument, already known for achievements as a defense-related maker, which started to handle automatic control systems much earlier. Needless to mention is Japan Radio, which has a record of performance in electronic machinery and equipment for antisubmarine P-C3 patrol planes. Nagano Nippon Radio, which is closely related to the air defense force as its subsidiary, is also a future defense firm. Incidentally, Kyosan Electric Manufacturing, a missile trajectory calculator maker, can be also named as a noteworthy related maker.

Although the direct relationship is ambiguous, Fujikoshi and Toshiba Machine, which contract extensively with defense-related firms, should not be forgotten. Machine tools are predicted to grow with the military goods as they are required for high performance primarily to satisfy the aircraft industry of Japan in the future.

Other firms which have excellent technology in their respective fields will be more or less involved in the defense industry in the sense that the breadth of the defense industry will be expanding with its growth.

Weapons offer such a promising market that they can be called "the last large export commodity" left for the "Nippon" corporation. Such weapons are always required because of their characteristic high performance and superiority.

In this respect, it is needless to seek evidence in the case of computers. Engineers of Japanese industries are capable of producing high-quality products in a short time. There is no other way but to win with a brain that invents and cultivates high technology for Japan, since it is destined to the fate of having no resources, to compete and survive in the merciless competition of the international economy.

The defense industry is the type of industry for the future that conveniently suits this condition, and it has the merit of producing a blossom of applied technology from the defense technology.

Walking Aimlessly Alone in the Midst of Inconsistency

Is this fate responsible for the outcome of the vision held by financial leaders who address the strengthening of the defense industry with the images of the postwar "Shipbuilding Empire, Nippon" and the "glory" of the past Japanese Navy? According to that "logic," it is not impossible to understand the feeling of financial leaders who worry about the future of Japan, the resourceless desert, and cry out for barter trade, weapons for oil.

Yet, even in the name of the driving force which enables industries to compete to the end in the international arena and to support Japan's economy, it is not so easy to erase a tinge of anxiety over the short-term advocacy of repeal of the weapons export ban and reinforcement of the defense capability.

If we should happen to be adventurous enough to try to lift the weapons export ban as a policy for the survival of the industries, we would be making a grave, irrevocable mistake.

Turning from the context of the topic being discussed, it is said that American financial leaders and those around the Department of Defense are heard to say: "How about letting Japan make carriers, and have the U.S. Navy lease them?"

On the other hand, there were once rumblings from a part of Japan's financial world: "If there is any way Japan can get orders subcontracted..." by taking advantage of the 5-year shipbuilding and reinforcement plan of the U.S. Navy (97 ships to be built, budget $50 billion).

This comment was criticized: "It is not proper to show one's appetite for a large business talk, pushing aside the unsettled discussion relating to the issues of the augumentation of the defense capability and the lifting of the weapons export ban." After all, this deal seems to have gone up in smoke. Nevertheless, strange hustling of the financial world continues, somehow reminding us of the gloomy past incident, "Merchant of Death."

Anyway, the defense industry is regularly achieving results after results, expanding its breadth and scope. In this march for progress, the electronics sector is also about to take an important place. Japanese computer makers which were behind IBM in the past now can fight on equal terms in hardware against IBM.

Before we know it, the defense industry has rapidly grown large enough to start walking by itself. Naturally, there is contemplation about joining the international weapons markets. The defense industry must live through a transitional incoherent period, confined by the heavy chains of the weapons export ban, surpressing the compelling desire to make a display of its potential ability at any given moment.

8940
CSO: 4105/248

SCIENCE AND TECHNOLOGY

JAPANESE AIRCRAFT INDUSTRY SELECTING FOREIGN PARTNER FOR NEW YX PROJECT

Tokyo TOKI NO KEIZAI in Japanese No 298 Jul 81 pp 50-51

[Text] Aircraft Industry at the Crossroads

Betting on the New YX Project

The new YX project (commercial passenger aircraft for the period after next) will "determine the 'image' and 'direction' of the Japanese aircraft industry in the 1980's and 1990's." Since 1979, under the leadership of MITI, the Japanese manufacturers (Mitsubishi Heavy Industries, Kawasaki Heavy Industries, and Fuji Heavy Industries) have been working to choose a foreign partner and the manufacturers to be involved in the program have been narrowed down. First is the Boeing Company. The Boeing Company is the world's largest manufacturer of commercial passenger aircraft and has been working together with Japan on the YX program now under development. Another possibility is the combination of Fokker (of the Netherlands) and McDonnel Douglas (of the United States). At one time Airbus Industrie, an EC consortium, was a strong candidate, but it has dropped to the rear. At present, it has become very likely that Boeing or Fokker and McDonnel Douglas will be chosen.

The new YX is a medium size, short-distance jet aircraft which seats 130 to 150 passengers. It has good fuel economy and a low noise level. The partner will be chosen this year and development and production will begin with the objective of making a first flight in 1986. The commercial cargo aircraft development association of the foundation which worked with the YX is slated to be the development organization on the Japanese side.

The general framework of this plan did not take shape smoothly because a number of prospective partners emerged and caused a difference of opinion ot arise between the government and industry. MITI was set on Airbus Industrie of Europe. It wanted to get in on that company's SA1 and SA2 projects (aircraft with seating capacity of 130 to 160).

In contrast, industry had doubts about Airbus. The company was very aggressive in selling its A300 and A500. The industry side felt that "if the government orders us to work with Airbus, we at least want it to take care of the sales risk." For the new YX, just as for the YX, MITI is only providing assistance of up to half of the development costs borne by the Japanese side.

In that case, the industry felt that the most reliable choice would be the Boeing Company which controls 50 percent of the world market. In fact, until recently it was thought that the Boeing Company was almost the definite choice. The proposal seen as most likely of success was the "forming of a consortium between Japan, the United States, and the Netherlands," by adding Fokker to Japan and Boeing.

However, at this point, an unexpected "event" occurred. Fokker decided against a tie-up with Boeing and, joining with McDonnel Douglas, announced the MDF 100 (seating 150) development plan.

A reason behind the change made by Fokker was probably the highhanded attitude of Boeing. Fokker wanted a three-part equal division of responsibility for development, production, and sales. It even presented a plan for such a three part division of the market with "the American continent going to Boeing, Europe to Fokker, and Asia to Japan," and would not give an inch. The Boeing Company, in turn would not retract its plan for developing a new aircraft under its leadership. Boeing's new aircraft was tentatively called the B7-7 (seating capacity: 150). Also, there were a number of peripheral projects crowding the docket. Therefore, even if it tied up with Boeing, there was a danger that the project would be delayed in getting off the ground much longer than Fokker had planned.

These concerns of Fokker's greatly worried the Japanese even though they wanted to work with Boeing. MITI's basic position was: "Even if the new YX project is somewhat stretched out, we would like to keep it confined to the 1990's."

It decided that "we will not follow in the tracks of YX." The ministry also declared: "If there is a strong sense of Japan merely being a subcontractor, we will not provide assistance."

The first aircraft in the YX program is scheduled to be delivered by next fall. Orders have already been received for 300 aircraft and it is being called "a best-seller airplane." However, as signified by the name of the new plane, Boeing 767 (seating capacity: 229), Boeing totally dominated the project throughout. Japan and Italy are also participating in the project but their share of investment is only 15 percent each, and they depend on Boeing for everything, including basic design, sales, and support. It would not be an exaggeration to say that the Japanese role is "even less than that of a subcontractor." The Japanese are chiefly in charge of fuselage panels. The technical requirements of Boeing are very strict and a large-scale loss is already expected in the account ledgers. Mitsubishi, Kawasaki, and Fuji, the aircraft body makers, are screaming: "We cannot make this work unless we raise the price by 20 percent."

These aircraft makers are anxious to put an end to the subcontractor role, saying: "In the new YX, we would like to participate in building the main wings and, ultimately, in assembly." However, they are not eager to cut off their relationship with Boeing. The makers' secret desire is to limit the "emporer" role of Boeing and expand their own territory, if even by just a little. Therefore, Fokker's radical "three-part plan" has been supported as a convenient strategy against Boeing. However, Fokker finally dropped out and the Japanese partner selection process is back at the starting point.

Is It Possible To Escape a Subcontracting Role?

The effect of Fokker tying up with Douglas rather than Boeing is very great for Japan. Of course, the new "equal partnership" has asked Japan to participate. The conditions are very attractive. An equal partnership of three companies is being proposed. In addition, they say that the Japanese "can participate in development and production of major components of the MDF 100 and, in addition, a jet engine under joint development by Japan and Great Britain will be used in the plane."

These conditions should be satisfying to MITI and the industry. The problem is in sales. There is fear that it may be impossible to be successful in sales competition without Boeing.

To this, Fokker replies that "a movement to get away from Boeing is developing among the airlines." It says that Douglas decided to adopt this project ahead of another one already under way this year because of a request from the airlines. Boeing controls the commercial aircraft market and this means that the airlines do not have a right of choice of new aircraft. Competition between airlines is becoming tougher and all the companies are taking a strong policy of putting special features into their aircraft. Therefore, it is necessary for the users to regain a right of choice. Douglas and Fokker have undertaken a "marriage" in order to get in on this movement to drop Boeing.

It is reported that MITI is showing a desire to accept the invitation of this new combination. This is because there is great danger in tying up with Boeing alone after Fokker, who fiercely supported the Japanese position, has left. It would be a huge burden to fill in the gap left by Fokker. If the request for taking a greater burden of funding is rejected in consideration of Japanese financial conditions, it may be necessary again to suffer to "grief of being a subcontractor" experienced in the three-way American-Japanese-Italian YX project.

However, there is also the following viewpoint. "Even Boeing cannot ignore a tie-up between the Japanese manufacturers and the union of Douglas and Fokker. This should make it possible to carry out profitable negotiations with Boeing."

The important thing is to suppress the tyranny of Boeing. "It is essential to form a profitable tie-up." Behind this posture is "faintheartedness." "No matter what happens, Japan cannot assert leadership. Therefore, it is assuring to have a tie-up that is as advantageous as possible with Boeing because of its great strength in sales." This is probably the real feeling of the manufacturers.

This does not give the impression of a posture of "establishing an independent industry as we approach the 1990's" as proclaimed by MITI. Just as in the previous YX plan partner selection, the Japanese camp conspicuously continues to adopt a passive position. If they truly "want to participate in development as equal partners," the time for decision is at hand.

For this purpose, the tie-up with Fokker and Douglas seems to be the best policy. However, even here, many say: "Under the present circumstances, the Japanese will be equal partners in name only. There is a strong possibility that they will only be put in a little higher class of subcontracting than in the YX project." This is because Japan has no ability to open markets. Of course, unlike the Boeing tie-up, it may be possible to obtain an equal partnership with the other two companies through persistant negotiations, but the problem is whether the MITI manufacturers can make a decision or not. To put it differently, it is a problem of whether they can face the risks of development, production, and sales. The Japanese aircraft industry is standing at a crossroads. Will it continue to take the easy role of "a subcontractor who meets deadlines and delivers good quality," valued by European and American industry. Or will it take off as a full-fledged aircraft manufacturing industry?

9651
CSO: 4105/249

SCIENCE AND TECHNOLOGY

TOSHIBA TO EMPHASIZE R & D IN ELECTRONICS, ENERGY

Tokyo SANGYO TO KEIZAI in Japanese Vol 35, No 8, Aug 81 pp 80-84

> [Text] Toshiba leads the heavy electric industry in four areas--"OA, defense, nuclear power, and ME." Especially recently, it has been involved in R & D in the "two E's"--"electronics" and "energy." Its stock has reached a postwar high and the company structure under president Saba, who is entering his second year as president, is about to realize its potential. (Editorial)

Saba Policy to Spur Nuclear Power

It has been almost a year since Toshiba was reorganized under Chairman Takeo Iwata and President Shoichi Saba.

With the general meeting of stockholders held at the end of June 1980, the Saba era began.

President Saba was born in 1919 in Tokyo and graduated from the elctrical engineering department of Tokyo University; he is a so-called "engineer president."

Since this engineer president first appeared at Toshiba, the trend toward hiring engineers as executives suddenly became stronger.

This June, Hitachi Limited appointed Massashige Mita as president, he is a 1949 graduate of the electrical engineering department of Tokyo University.

At the same time, Tsunasada Yamamoto became president of Fujitsu. He is a Tokyo University classmate of president Mita of Hitachi and also a graduate of the electrical engineering department.

Hideo Abe, the new president of Fuji Electric, is also a graduate of the engineering department of Tokyo University. Therefore, with Saba's appointment as president of Toshiba, the top management [of major heavy electric companies] has come to depend strongly on engineers. The move is most typical of Toshiba, whose motto has always been "Toshiba of Technology" and which has always taken the initiative in developing new products. It can be said that Toshiba has ushered in a new phase in management style.

The previous Iwata era emphasized three pillars or principles of management: "selective management," "strengthening of affiliated companies," and "internationalization of business." With the coming of the Saba era, a fourth has been added: "emphasis on technology."

At the core of this fourth pillar are the "two E's."

The "two E's" are energy (nuclear power, geothermal, etc) and electronics (semiconductors, ME, OA, and VTR); however, Toshiba's emphasis is on R & D in these two areas.

In the days when the late Taizo Ishisaka was president, Toshiba's philosophy was one of "management with a high sense of integrity." During Toshio Doko's presidency, it was "management with emphasis on technology"....

This, however, was changed to "management with priority on profits" when Iwata became president.

During the recession that followed the oil shock, improvement in earnings was the major issue of the heavy electric industry. With Saba's appointment, "emphasis on new technology" has been revived and focused upon. We must say that this is all in response to the needs of the time.

First of all, Toshiba's strength is in its nuclear power department. Its rival, Hitachi, has created four departments--"OA, defense, nuclear power, and ME"--to map out strategies for the eighties. It has also created promotional headquarters.

These are the areas in which Hitachi must catch up with Toshiba--in other words, the areas where Toshiba leads Hitachi.

Toshiba is Japan's largest boiling water reactor manufacturer. To date, it has delivered eight reactors to Japanese electric power companies and holds the number one position in Japan.

The present balance of orders received includes three units--for the Second Fukushima Nuclear Power Plant No 3 and Kashiwazaki-Kariu No 1 of Tokyo Electric Power Company, and Onnagawa of Tohoku Electric Power Company. The prospect for future orders is also promising.

In any case, Japanese energy policy has begun to emphasize nuclear power generation which is capable of recycling.

In this sense, we can expect Toshiba to spur the development of its nuclear power department.

President Saba is an expert in the area of nuclear power.

"Already, Toshiba's light water reactor technology is nearing completion. We have nothing to learn from G.E."

As these words indicate, it would seem that in terms of economy and safety, the development of the light water reactor has almost reached an end.

The future task is to apply electronics to all areas of systems control which are still done manually.

If this is to be achieved, human errors that occur occasionally, creating chaos, can be eliminated.

When computerization of the control system is complete, operational mistakes will be eliminated entirely and so will the troubles accompanying selection of plant sites.

In other words, this will brighten the future of nuclear power plant construction and bring an increased volume of work to Toshiba.

Already, computerization of control systems in hydro and thermal power plants has progressed considerably, and Toshiba's system has been purchased by various electric power companies.

The computerization of nuclear power plants will soon play an active role as Toshiba's major weapon during the Saba era.

Toshiba, as we all know, is number one in the manufacture of boiling water reactors (BWR).

Recently, it has begun designing a new BWR in collaboration with G.E. of the United States and Sweden's ASEA-ATOM.

Since the commercialization of this new reactor is near, it will contribute greatly to an expansion of Toshiba's market share.

Toshiba's Overwhelming Strength in Radars

Along with nuclear power, Toshiba has overwhelming strength in radars, which require the most advanced electronics technology of all defense equipment.

Recently, Toshiba became the principal contractor for short-distance surface-to-air missiles (short SAM), which are said to be Japan's most salable weapon along with the BADGE (base air defense ground environment) system X; this is a large contract totaling 300 billion yen.

Toshiba's radar is equipped with a "phased alley radar air-work-on system" which represents the world's most sophisticated radar technology; it has been highly evaluated by the Defense Agency.

The Defense Agency is expected to place an order for six sets (four for ground self-defense and two for air self-defense) for fiscal 1981; in terms of a mid-term project estimate, 26 sets are expected to be ordered.

For Toshiba, this means that it would have an ample opportunity in the future to demonstrate its ability in this area as well.

Next comes the battle over the BADGE system.

The current BADGE system was decided on in 1963 as the priority project for the second defense term (1962-66), and has been in force since 1968.

Toshiba competed with Nippon Electric for the right to manufacture the system. But Nippon Electric, which had a license contract with the Hughes Corporation of the United States, succeeded in obtaining the order.

The system was manufactured by Nippon Avitronics, a joint venture firm of Nippon Electric and the Hughes Corporation.

But almost 15 years have passed since then, and the system is now outdated. Therefore, the fiscal 1981 budget allowed for funds to cover selection and equipment expenses for the BADGE system. It is believed that within the year the Air Staff Office will determine the manufacturer who will develop the new BADGE system.

The BADGE system connects a large computer with radar networks distributed throughout the country and detects enemy aircraft approaching Japan.

It involves electronics equipment with emphasis on computers, and the new BADGE system is expected to cost 300 to 500 billion yen.

Because the contract battle is on such a large scale, the activities of Nippon Electric to date and the extent to which Toshiba can attack and reverse the situation are attracting outside interest.

In addition, Hitachi, Fujitsu, Mitusbishi Electric and Oki Electric are also in the bidding. The question, therefore, is to what extent Toshiba can roll back.

This will also be the time to test the managerial skills of president Saba.

Ten years ago, the computer [in the BADGE system] was IBM's. Today, however, Japanese computers have become competitive. In this area at least, the situation is not necessarily favorable to Toshiba.

But since the Defense Agency is said to be considering a joint developer, we must say that the possibility of Toshiba participating in the project is good.

Recently, vice president Tomio Tanatsugu of Toshiba became chairman of the Japan Arms Industry Association.

In the past, Toshiba's products have been used extensively in the electronics equipment of F-15 fighters and P-3C antisubmarine patrol aicraft.

In addition, Toshiba products are found in other aircraft equipment, so Toshiba's contribution in this field is expected to expand in the future.

Furthermore, Toshiba Machine Co Ltd, an affiliate of Toshiba, has been long emphasizing aircraft machine tools. Its future development is of interest to the Toshiba Group.

Toshiba Shows 20 Percent Growth with ME

Along with defense equipment, ME is another area in which Toshiba's industrial strength is demonstrated.

ME stands for medical electronics. Toshiba's application of electronics to medical equipment, as witnessed by such labels as "Toshiba of X-rays" and "Toshiba of Roentgen," has a wide acceptance.

On top of this, due to the development of electronics technologies, its product line has become increasingly diversified.

New equipment such as the following are under continuous development: CT (computer tomography), a supersonic diagnosis system, a patient monitoring device, and an automatic chemical analyzer.

Among these, the X-ray CT and supersonic diagnosis system represent Toshiba's two major ME products, comprising 40-50 percent of all such equipment sold in Japan, by far the greatest share in Japan.

The sales of ME products by Toshiba, the largest manufacturer, for the March 1981 period was 92.6 billion yen, a 20-percent increase over the same period a year ago.

Hitachi Medico recorded sales of 47.5 billion yen, an 18-percent increase.

Shimadzu Seisakusho's sales were 30.6 billion yen, a 10-percent increase; those of Yokogawa Electric Works, 13.6 billion yen, a 14-percent increase.

From these figures, we can see how Toshiba is running ahead of its competitors.

Toshiba's sales, however, for the previous period showed a 23-percent increase, which means that sales dropped a bit during the March period.

Some regard this as a result of the scandal that involved Fujimi Obstetrics and Gynecology, so society is watching ME closely.

But since Toshiba is the leading manufacturer, it is responsible for the widespread use of ME. And as a result of its development of low-cost, full-body CT's, its share in ME sales should improve.

Toshiba's sales for the March 1982 period are expected to reach 106 billion yen, an increase of 15 percent.

Hitachi Medico anticipates 50 billion yen in sales, a 5-percent increase; Shimadzu, 32.4 billion yen, a 6-percent increase. In comparison, Toshiba is trying to be the first in the industry to reach the 100-billion-yen mark.

It is also stressing exports, which have grown considerably in the European markets. Today, its technology is acclaimed worldwide and is on part with that of Siemens of West Germany, considered the best in the world.

It is conceivable that Toshiba will eventually surpass Siemens. There are those who anticipate that Toshiba will, in the next 2 or 3 years, be the world's leader in ME.

President Saba is always shouting, "persistent growth."

Nuclear power, radar, and ME are the three powerful products which Toshiba's engineers have perfected over a long period. These will be its strategic products in the 1980's, outperforming those of its competitors.

The Age of OA Owed to Toshiba's Efforts

Following behind these three major products is Toshiba's industrial electronics.

While Hitachi and Nippon Electric were developing their large computers, Toshiba was threading between them, concentrating on OA (office automation).

Now we are said to be in the age of OA; this, however, is owed greatly to the pioneering efforts of Toshiba. It is also the age in which Toshiba's OA is being recognized.

OA is a system product which mechanizes office work by combining various items of equipment, such as the facsimile, copier, office computer, personal computer, and word processor.

At present it is a 600-700 billion yen market; but it is beginning to show signs of growing into a market as large as that of nuclear power in the 1980's.

Currently, Toshiba is the top manufacturer of office computers, personal computers, and word processors.

Needless to say, Toshiba is the leader in terms of system knowhow that combines these equipment.

In particular, Toshiba is the perennial frontrunner in the area of terminal equipment that meets the needs of a new era. These include OA-related optical character reader (OCR), data processor, and multiple function telephone.

Recently, Toshiba developed the "TR-15," a new automatic zip code reader which reads and sorts out letters even when handwritten and printed codes are mixed together.

The first machine was delivered to the Tokyo Central Post Office.

Prior to this, it was impossible to process both printed and handwritten zip codes simultaneously.

The new model can process 27,000 letters per hour. A semiconductor image element (CCD one-dimensional censor) is used for reading the codes; it is therefore highly reliable.

As can be seen here, what is needed in OA and its related equipment is the semiconductor. As far as IC and ISI are concerned, Toshiba is number three, behind Nippon Electric and Hitachi.

Thus, Toshiba's position as one of the big three is secure; but with an increased production facility it is pursuing the two competitors.

Toshiba has mass-production plants in Oita and Hyogo, local bases in Fukuoka and Iwate, and a research center in Kawasaki.

The recent topic of interest in the industry is the increased production of 64-kilo bits, which is said to be the first generation of super LSI (large-scale integrated circuits).

In October, Toshiba will begin production of 100,000 units of 64-kilo bits per month.

Toshiba's production volume will follow behind Hitachi's 200,000 units, Fujitsu's 150,000 units and Nippon Electric's 100,000 units.

With respect to overseas production, since April last year, Toshiba has made inroads in the United States, in addition to Malaysia, Korea, and Mexico.

Toshiba has been manufacturing 64-kilo bits in Silicone Valley outside San Francisco, and has recently expanded its plant. Things are going so well that it has doubled its monthly production to 2 million units.

The Toshiba plant in the United States began when it "inherited" 100 percent of Maruman Integrated Circuit Corporation's (MIC) stocks; Maruman was a U.S. subsidiary of Manse Kogyo (headquartered in Kawaguchi), not a major Japanese corporation, but a solid one.

MIC was located in Sunnyvale, California, and was a semiconductor manufacturer established in 1976 by Manse Kogyo.

Toshiba's move was an extremely smooth operation designed to lessen the friction in the U.S.-Japan semiconductor war.

This was the second purchase of a U.S.-based enterprise by a Japanese semiconductor manufacturer; the first was Nippon Electric's purchase of Electronics Alleys.

On 4 June, in order to strengthen the production of peripheral computer equipment, Toshiba announced that it will establish a new facility within its Ome plant, which is its major computer plant.

This is because of increased demand for OA products such as office computers, minicomputers, personal computers, and word processors.

On the other hand, OEM sales of printers and magnetic disks have also been excellent. And since high annual growth rates exceeding 35 percent are expected for these items of terminal equipment, the decision to build a new plant was made.

It will be the first time in 9 years that Toshiba will be building a new plant.

The new plant will be a two-story iron-reinforced structure, costing 2 billion yen, and it is expected to be completed in March 1982.

This new plant will increase the production capacity of printers by 2.5 times, magnetic disks 4 times, and floppy disks 3.5 times.

For fiscal 1981, Toshiba recorded 95 billion yen in sales from data processing systems; for fiscal 1982, it expects sales of 110 billion yen. It is for this reason that it decided to move ahead with equipment investment.

Toward Development of a Leading Product in Home Appliances

In the home appliance department, Toshiba is stressing VTR's.

Its monthly production is 50,000 units, which is equal to about 8 percent of the market.

There is room for growth here, since Matsushita, Sony, and Victor are turning out 100,000 units per month.

Judging from the 17-percent market share of its color TV Toshiba's share will grow in the future.

For this reason, this April, Toshiba transferred managing director Shoichiro Watasato from the Heavy Electric Department to head the Light Electric Center.

His predecessor, managing director Junichi Hiyoshi, became the chief of the Toshiba's Technology Department.

Mr Watasato is a veteran of production control, Mr Hiyoshi a specialist in home appliance technology. It is seen that Toshiba's intention is to shorten the time between technological development and final product by combining these two experts.

Herein we perceive clearly Toshiba's desire to develop a lead product for the new age in home appliances.

Toshiba's March 1981 period sales reached 1.5475 trillion yen (1.42767 trillion yen in March 1980), an increase of 8 percent in earnings.

Along with this, the operating profit was recorded at 82.8 billion yen (75.3 billion yen in March 1980), profits at 44 billion yen (41 billion yen in March 1980), an increase of 10 percent in profits.

Profits per share rose to 19.9 yen (18.8 yen in March 1980) and dividends to 14 percent (12 percent in March 1980), an increase of 2 percent.

Hitachi also recorded dividends of 14 percent, or an increase of 2 percent.

Fiscal 1981's consolidated financial reporting based on the above figures would yield 23 yen profit per share for Toshiba, 49 yen for Hitachi.

Therefore, there is still considerable difference between the two.

This is reflected in the value of shares in the two companies.

Toshiba's annual high for 1980 was 250 yen and its annual low was 174 yen.

In 1981, however, the stock rose quickly and it was 314 yen in March, 371 yen in April and 428 yen in May.

The May figure was the postwar high for Toshiba.

Hitachi's stock, on the other hand, stood at 460 yen in March, 585 yen in April, and 690 yen in May.

Waves of investment by foreigners made heavy electric stocks rise, but if we look at the ratios, we see that Toshiba's stood at 19 percent, Hitachi's at 22.3 percent.

From the foreigners' point of view, Hitachi is more appealing. In the future, however, as has already been mentioned, we can expect investors to reexamine Toshiba, whose strength is in "OA, defense, nuclear power, and ME."

With respect to nuclear power plants, an order by Shimokita No 1 of Tohoku Electric Power Company is nearing for Toshiba.

In the area of defense, there will be increased demand, from missiles to electronic equipment for warships.

In April, Toshiba started production of microwave ovens in Tennessee.

It has also decided on a capital increase of 200 million shares offered to the public with payment due this September. For a face value of 50 yen, it will be the largest of its kind in history, and the amount procured, based on current stock value, will total about 80 billion yen, next only to Toyota's 90 billion yen.

Hitachi is also considering a public offering of 100 million shares, but this will take place in the latter half of 1982.

Toshiba's current attempt to increase capital follows the one-fourth capital increase of 1969 and the third person quota capital increase of 52 million shares in 1966; therefore, if this attempt is realized, it will bring excitement to the stock market

9711
CSO: 4105/244

SCIENCE AND TECHNOLOGY

MITSUBISHI ELECTRIC ACTIVITIES IN ELECTRONICS FIELD NOTED

Tokyo SANGYO TO KEIZAI in Japanese Vol 35, No 9, Sep 81 pp 80-83

[Excerpt] Vigorous Pursuit With Super-IC and VTR

In the era of electronics, Mitsubishi Electric Corporation has the spotlight. Its "talking" NC lathe was a hit, and, in the area of defense equipment, it has taken the lead in the contract battle for the next generation of surface-to-air missiles. It has restructured itself so that it is capable of seriously challenging the leading manufacturers of super-IC and VTR. Finally, it is attracting much attention in the securities market. (Editorial)

Electronics Led the Way

As the core enterprise of the Mitsubishi Group, Mitsubishi Electric's strength lies in its initiative in so-called industrial electronics. This includes pioneering electronics technologies in defense and space related equipment, OA, office computers, and NC machine tools. Particularly in the area of defense, Mitsubishi has recently been attracting worldwide attention; it has great potential for further development.

For example, the percentage of electronics equipment used in the 7.3-billion-yen F-15 fighter is 30, and in the P-3C it is nearly 40 percent.

The business of selling modern military weapons is characterized as an "electronics-computer battle;" needless to say, electronics are being applied rapidly to missiles as well as to tanks.

Mitsubishi's contract with the Defense Agency for the March 1981 period increased by 34 percent and totaled 12 billion yen.

It is said that the Defense Agency's orders for electronics equipment will increase by at least 20 percent in the next 5 years.

The recent big news is the almost certain decision to replace the Nike with the Petriod missile, manufactured by the joint team of Mitsubishi and America's

Raytheon Corp. This is the 1.5-trillion-yen contract battle for the next generation surface-to-air missile.

It is forecast that the profit per share of Mitsubishi stock for the March 1982 period will be 16 yen.

In terms of the consolidated financial statement, it will be 24 yen. Purchases by foreigners have been consistent, and the balance of credit purchase has been reduced by half since the peak period.

We would watch [the stock's climb to] the 400-yen mark closely as Mitsubishi Electric pursues Hitachi Ltd.

The above favorable description is made by Mideo Hirabayashi, executive director of Maruman Securities.

When I was reading CHUNICHI SHIMBUN the other day during a business trip to Nagoya, I noticed the headline "Mitsubishi for Defense and OA" in the "Zubari Shindan" [Exact Diagnosis] column in the securities section; it gave a high evaluation.

Certainly, Mitsubishi these days offers us endless material for conversation; that does not have to be pointed out by the securities industry. The biggest topic recently has been the news, mentioned above, that Mitsubishi and the U.S. Raytheon's Petroid has been selected to replace the aging Nike J as the next generation super-large surface-to-air missile (SAM-X).

As the post-Nike missile, Petriod was in competition with the Nike Phoenix developed jointly by America's Hughes and McDonnel Douglas and Japan's Mitsubishi Heavy Industries, also of the Mitsubishi Group. However, the battle was said to be over when, at the June clerical level U.S.-Japan defense conference held in Hawaii, the United States strongly requested that the Petriod be introduced in Japan.

The outcome can be seen as the result of strong influence exercised by President Reagan.

The Petriod is the missile which the U.S. military commissioned Raytheon to manufacture for the air defense of NATO nations; nearly 20 years have been spent on research and more than 50 billion yen on development.

Because of the request made by the United States, it was informally decided that the Japanese Ground Self-Defense Force will first use the Petriod for four of the eight antiair artillery units.

In addition, it seems inevitable that the Air Self-Defense Force will also introduct the Petriod.

The Air Self-Defense Force has been using the Nike, but since it cannot afford both the Nike and the Petriod, it will concentrate on the latter alone.

As far as missiles go, the practice in Japan had been for Mitsubishi Heavy Industries to be in charge of "air," Mitsubishi Electric in charge of land. However, with the recent move, the roles have been changed and Mitsubishi Electric would assume a superior position.

The report on the Mitsubishi contract appeared as a scoop in NIKKAN KOGYO SHIMBUN on 9 July and attracted the attention of those concerned.

This evoked a great reaction within the securities industry in the form of aforementioned recommendation to invest in Mitsubishi. But on 25 July, NIKKAN SHIMBUN reported that the Self-Defense Agency had decided to postpone the introduction of the SAM-X for 2 years, making the situation rather delicate.

A Joint Plant with Westinghouse of the United States

Another noteworthy item with regard to Mitsubishi Electric, as pointed out in the "Zubari Shindan" column, is the consolidation of its Electronics Division.

In April 1980, the company built two research centers: the Electronics Product Development Research Center aiming at reinforcement of VTR and audio equipment technologies, and the ISI (large scale integrated circuit) Research Center.

Next, in October of the same year the company established an Office Automation Project Room, and in May the Personal Computer Department in the Electronics Division.

Then, in June Mitsubishi announced that in addition to the Electronics Related Project Promotional Division, it would establish an Information Electronics Research Center for R & D of optoelectronics (photelectron engineering).

Since June 1980, when Ninhachito Katayama became president of Mitsubishi Electric, he has been pushing for the expansion and strengthening of the electronics departments.

In particular, the Electronics Related Project Promotional Division was established toward the end of June because of increasing new technologies which could not be covered by the existing five divisions--heavy electric, electronics, machinery & equipment, products, and overseas. Vice president Koji Imakita (born in 1913, joined Mitsubishi after graduating from the Department of Engineering, Waseda University, in 1938) was appointed director of the newly created division.

In addition, Seiji Otani was appointed assistant director of the division, along with the Shigehiko Takahashi of the Home Appliance Department. The latter will retain his former position.

The new division will play the role of strategy headquarters which will plan all aspects of electronics related matters, including technological development, merchandising, and establishment of sales networks.

Mitsubishi hopes to overtake the leaders in the field, Hitachi and Toshiba.

Another big related news item is that Mitsubishi Electric has decided to build a joint plant for integrated circuits in the United States with Westinghouse.

This is because, in its effort to strengthen the previously neglected ISI department, Westinghouse has asked for the cooperation of Mitsubishi Electric, with which it has had a long-time technological tie-up.

The first reason why Mitsubishi Electric decided to agree to the request is that it wished to return the past favor bestowed upon it by Westinghouse; the two companies have been in a technological cooperation relationship since 1923.

Second, Westinghouse has proposed conditions favorable to Mitsubishi--the latter only has to reveal its circuit manufacturing technology and transplant it to Westinghouse engineers. Moreover, while Westinghouse will be responsible for the entire cost of construction of the plant, Mitsubishi will run the plant as well as the research center.

The plant is expected to produce 64-kilo bit (a 5 cubic millimeter chip containing about 70,000 transistors) integrated circuits and super-quality microprocessors which form the heart of a computer.

The proposal was extremely timely, because for some time Mitsubishi had been considering the possibility of expanding its business into the United States. The joint plant will be a plus for both companies.

Mitsubishi's Vigorous Pursuit of Leaders in Production of Semiconductros

In addition, recently the United States has been requesting that Japan lease its advanced electronics technologies to be used in its defense industries. The above-mentioned joint plant is entirely unrelated to this trend, but it is attracting outside attention as a case in which a long friendship has contributed to the smooth running of a joint project.

Be that as it may, Mitsubishi is vigorously pursuing the domestic leaders in semiconductor production.

With respect to the aforementioned 64-kilo bits, as of this October, Mitsubishi will start monthly production of 100,000 units at the Kumamoto plant.

Hitachi, Fujitsu, and Nippon Electric are currently manufacturing 15,000-270,000, 150,000, and 100,000 units per month of the 64-kilo bits, respectively; these three companies are anxious to triple their production during the second half of this year.

In contrast, Oki Electric has been producing 300,000 units since August at its Miyazaki plant. It is likely that Toshiba will reach monthly production of 100,000 units by October.

Mitsubishi Electric's position is that: "Demand from peripheral equipment manufacturers, such as makers of personal computers and terminals, is on the rise. And since this demand is based on cost and performance comparisons, we have decided to enter into full-scale production."

Riding on the wave, Mitsubishi has decided to begin production in the United States.

Already in April 1980, Toshiba built a giant plant with monthly production capacity of 2 million units in the Silicone Valley, outside San Francisco.

In September, Hitachi is expected to follow, expanding its 300,000-unit monthly production plant in Dallas, Texas.

Next spring, Nippon Electric will begin monthly production of 3 million units in Roseville, California. In June of this year, Fujitsu built a new plant in San Diego, California, which is expected to reach monthly production of 500,000-600,000 units.

In the midst of all these activities, Mitsubishi will join hands with Westinghouse, a giant U.S. manufacturer, and enter the semiconductor market. Because of Westinghouse's marketing strength, Mitsubishi is seen as having gained a strong ally in the semiconductor war.

Mitsubishi plans to expand its Electronics Division actively, with the production of semiconductors at its base. One project which merits our attention is its decision to concentrate on the development of interchangeable equipment for IBM computers.

The objectives of this project are to develop new generation models which will replace Mitsubishi's current medium and large models, the COSMO 700, 800, and 900 series, and to market new medium and large model series, all of which will be interchangeable with IBM's large models and software.

The reasons why Mitsubishi is emphasizing the interchangeable series are as follows: 1) Japanese large computer manufacturers, Hitachi and Fujitsu, are producing models that are interchangeable with IBM computers; 2) in order to survive in the large-model computer market, one must have something in common with IBM computers, and this is limited to software; 3) since about 70 percent of the Mitsubishi Group uses IBM's super-large or large computers, it is advantageous to manufacture interchangeable equipment.

Because of this, and for the purpose of developing interchangeable hardware, this year Mitsubishi intends to increase its engineers from 200 to 300 and invest 20 billion yen.

At the same time, it will also move into the production of "personal computers."

A personal computer is a private computer for which demand, in conjunction with the recent popularity of "office automation" (OA) and because it is easy to operate, is growing. Mitsubishi, too, has stressed this market and has revealed its plan to place personal computers on the market by April 1982.

The top personal computer manufacturer in Japan is Nippon Electric. It has greatly increased its production, from 50,000 units last year to 120,000 units this year.

Sharp Electric, the second largest manufacturer, has also doubled its production from 300,000 to 600,000 units.

Behind them comes Toshiba, which is strengthening its production, and Fujitsu, which entered the scene this April.

It is said that Matsushita Communication Industrial will market personal computers by the end of the year. By next January, IBM, too, will reveal its product line in the United States. Sooner or later, it will enter Japan.

Top in NC Lathes

Thus, Mitsubishi has also entered the fiercely competitive personal computer market and is showing signs that it will surpass Nippon Electric, Sharp, and Toshiba.

In any event, we can see that from a brief look at the state of computers and personal computers, each electronics company is intensifying its offensive structure more fiercely than ever.

Another noteworthy area in this field in NC machine tools.

For some time Mitsubishi had been eyeing the automatic machine tool market; with Yamazaki Ironworks, the experienced manufacturer of NC lathes, Mitsubishi has jointly developed and manufactured NC lathes equipped with a talking device. This was a topic of much conversation.

The talking lathe is a convenient machine tool which is capable of carrying on a conversation and responding to commands.

The NC lathe is an automatic machine tool run by a computer and is already in wide use even among small and medium-size factories.

The NC lathe equipped with a talking device capable of handling necessary work orally was the outcome of improvements; it is expected to develop further demand.

A good product always encourages imitation.

The latest news is that this fall, Hitachi and Fujitsu will jointly introduce their first "NC lathe equipped with a talking device."

We must say that for Mitsubishi Electric, which has earned the top position in the lathe field, the appearance of an imitation is proof that others have recognized its raison d'etre.
9711
CSO: 4105/243

BUSINESS DIFFICULTIES OF PETROLEUM INDUSTRY ANALYZED

Gap in Performance

Tokyo TOKI NO KEIZAI in Japanese No 298, Jul 81 pp 95-99

[Article: "Bitter Battle Fought Within the Oil Industry as a Result of Widening Gap Between Enterprises"]

[Text] Settlement of Energy Conservation and Transfiguration of Oil Market

According to a report published by the Agency for Natural Resources and Energy (ANRE) of MITI on 6 June, Japan's 1980 primary energy supply (estimated) was 427.5 million kiloliters (in equivalent oil), a drop of 3.7 percent from the previous year ratio. This was the first time in 5 years, since 1975, that a drop from the previous year ratio was registered. Taking into consideration the fact that the 1980 net economic growth rate was 4.2 percent, this speaks clearly of the success of energy conservation measures taken by the Japanese economy.

However, Japan's energy conservation measures consist exclusively of reducing the oil consumption. The movement of fuel conversion for the purpose of "oil conservation" in the industrial field, in particular, is progressing at a brisk pace. For example, the 1980 oil import was 282.6 million kiloliters, a significant reduction of 10.1 percent compared with the previous year. As a result, Japan's oil dependency came down to 66.1 percent, the level of 1968 (it was 71.4 percent in 1979).

The government is strengthening its basic policy to establish a guarantee of economic security by emphasizing the development and introduction of alternative energy in order to reduce Japan's oil dependence to 56-47 percent by 1990. This policy is in line with the "de-oil" strategy which was adopted at the summit meeting of the oil-consuming advanced industrial nations "to break the link between economic growth and oil." During this process of decreasing oil demand, the demand structure of oil products is expected to change significantly.

The oil industry is a "serial product industry" in which it is impossible to produce only a single grade of oil. In Japan, a high economic growth rate centered around industrial heavy oil was achieved upon conversion to exclusively heavy oil firing by the thermal power generating stations (in 1960, so that Japan's oil products demand was characterized by a very high percentage of heavy oil. However, as "energy conservation" or "introduction of alternative energy" became more widespread in the industrial field, heavy oil, which was being produced in higher proportion, was clearly becoming oversupplied. In response to a "demand pattern" turning to lighter oil characterized by increased demand for kerosine and light oil instead of heavy oil, the oil industry is obliged to adjust its refining facilities and the type of crude oil used in order to meet the changes in the demand structure. While imported oil has a tendency to contain more heavy oil, the oil industry is faced with a demand structure which favors more light oil. In order to close this widening gap, the oil industry cannot do other than to build various new facilities.

Oversupply of industrial heavy oil and a consequent plunge in its price has worsened the management of those oil companies having a poor balance of oil grades. A large number of oil companies belonging to the national group with weak management foundations, which were already in distress with the ordinary burdens, probably cannot bear any additional investment burdens now. Moreover, the oil companies of the national group which depended heavily on the majors (international oil capital) for their crude oil supply, have tasted the sadness of not having an independent crude procurement system and an oil information network in the face of violent changes in the crude oil supply route as a result of the transfiguration of the international oil market. The majors, which were deprived by OPEC not only of the right to decide the price and volume of production of crude oil but also of a portion of the sales route, have sharply cut the supply of crude oil to so-called third parties, or the non-capital group of oil companies, and routed their crude oil preferentially to the more profitable oil companies of their own group (the foreign capital group).

Thereupon, "the cat (oil company) that can catch the mouse (crude oil) is the good cat no matter whether it is a black cat (foreign capital group) or a white cat (national group)" (head of ANRE) became the order of the day, and a period of real power struggle has begun, in which the ability to procure crude oil on the spot market independently has a direct impact on the operation of an oil company.

Crude Oil Cost and Widening Operation Gap

The percentage of oil product manufacturing cost occupied by the cost of crude oil was approximately 60 percent before the oil shock, and it went up to as much as 80 percent after the oil shock. With the raw material composition rate being so abnormally high, the oil companies are obliged to pass this stiff changeable raw material cost on to the product price.

Today, the crude oil price rise is not only due to inherent factors but also to political factors. A country such as Japan, whose crude oil procurement power is weak, is often forced to swallow an inflated crude oil price, consisting of the official sales price of the oil-producing country plus various forms of premiums, or else rush to buy at a higher price on the spot market influenced by incorrect oil information. The inflated crude oil import cost rooted in the insecurity of supply is shaking the foundations of the oil companies of the national group which can no longer depend on the majors for the crude oil supply. Especially when the domestic demand for oil products has relaxed, so that it has become more difficult to pass the increase in crude oil cost on to the consumers, the following situation is taking hold: "as the oil crisis subsides, the oil company crisis begins."

The 1980 balance sheet of the oil industry revealed that while the Aramco foreign capital group having a direct tie with Saudi Arabia (Nippon Oil group, Toa Neryo and General Sekiyu) was in the black in the last half period as well as the first half period of the year, the non-Aramco foreign capital group (Mitsubishi Oil, Showa Oil, etc) and the national group each experienced worsening profits in the last half period of the year. Dependence on Saudi crude oil or not made the difference. So it follows that while the Aramco foreign capital group which was able to purchase high grade Arabian light (standard crude oil) at a stable "lower price" was getting fatter, those oil companies which depended heavily on the militant OPEC members during the period of unregulated crude oil price after the spring of 1979 and those which had weak crude oil procurement power were getting pinched.

As the demand and supply are relaxed, each oil company may assign prices to the products reflecting the crude oil cost to its chain, creating a situation of "multiple prices for the same product" due to the "difference in crude oil costs." However, the prices will eventually converge toward the low value. Then, the fact that Saudi light crude oil is cheaper to import than other Middle Eastern light crude oil by 3-4 dollars a barrel (159 liters) will have a devastating effect on the profits of those companies belonging to the non-Aramco group, because a cost difference of 3-4 dollars a barrel of crude oil will appear as a cost difference of 4,000 yen or so per kiloliter of product oil.

In fact, the widening gap between the operational costs of the Aramco foreign capital group and the non-Aramco foreign capital group as well as the national group reflects vividly the differences in the power relationship of the International Oil Fund (industry). Namely, as the OPEC oil price is raised, the group having many oil and gas resources of its own is able to expand its sales and profits further. In fact, an "oil situation" has been created in which a group having a crude oil supply route so that it is capable of getting a large quantity of cheap Saudi crude oil, which occupies more than 40 percent of all OPEC oil export, will have a strong competitive edge even when oil demand is decreasing.

In these circumstances, the U.S. majors such as Caltex, Exxon, Mobil, and Gulf, which have access to Saudi crude through heavy pipe, can establish predominance in the oil business and also take the initiative in matters related to the alternative energy strategy. On the other hand, the British, Dutch, and French groups which have weaker ties with Saudi Arabia are suffering from reduced profits from oil business and are placed in a relatively disadvantageous position even in developing a general energy strategy. The predominance of the U.S. majors is expected to be aided further by the ending of domestic oil price controls by the Reagan administration.

The management gap between an oil company which is able to secure a steady supply of good-quality crude oil and having an investment policy and a sales power capable of adapting to the changes in the product demand pattern and another enterprise which is lacking in these is expected to grow bigger in the future.

The structural changes in the international oil market and the struggle for leadership among the majors will once more bring the law of the jungle that prevails in the oil business into the open. And the national group whose foundation is fragile is very likely to be obliged to reorganize itself anew.

Distribution of Power in the Foreign Capital Group and the National Group

The oil industry of Japan consists of 36 refining and original sales companies (20 foreign capital group and 16 national group) which exist in a disorderly fashion and bring about overheated competition. There are 13 original sales companies (8 foreign capital group and 5 national group), and 7 of them also have refineries. In Japan, the original sales companies distribute oil products usually through the following three routes: first, the "direct sale" to large users; second, "sales through the agencies"; and third, "the other route" consisting of sales via the liaison councils of agricultural and food associations. Another special transaction is (joint) resale among the dealers, with the object of this trade being dobbed "gyotendama [resold gems]." There are approximately 9,400 agencies (wholesalers) dealing mainly in gasoline, kerosine, light oil and lubricating oil. Most of these agencies have special contracts with the original sales companies and wholesale the products to the secondary agencies. Nationwide there are roughly 53,000 gas stations operated by the secondary agencies. The majority of these stations display the trademark of the original sales company so that the group affiliation is clearly visible.

To discuss the distribution of power inside Japan's oil industry, it is divided into eight sections according to the conditions of capital cooperation. These are four foreign capital groups (Nippon Oil, Shell Oil, Esso-Mobil, and Mitsubishi Oil) and four national groups (Kyodo Oil, Shukko Industries, Maruzen Oil and Daikyo Oil and its subsidiaries). The 36 companies of the oil industry may be grouped roughly as follows.

The foreign capital group:

The Nippon Oil group (in cooperation with Caltex) consists of Nippon Oil, Nippon Oil Refinery, Koa Oil, and Nihonkai Oil. This group constantly maintains approximately 17 percent of the sales share.

The Shell group consists of Shell Oil, Showa Oil, Toa Oil, Showa-Yokkaichi Oil and Seibu Oil. Toa Oil used to be a main force member of Kyodo Oil of the national group; it became a consigned special refining company of Showa Oil in 1979, when it was transferred from its parent company C. Itoh & Co to Showa Oil. However, crude oil is supplied to Toa Oil equally by Showa Oil and Kyoseki Oil.

The Esso-Mobil group consists of Esso Standard Oil, General Sekiyu, General Oil Refinery, Nansei Oil, Mobil Oil, Kyokuto Oil Industry, Toa Fuel Industry, Kignas [phonetic] Oil and Hiami Oil Refinery. General Oil was originally a sales company of the Mitsubishi group. It left Mitsubishi in the spring of 1979 and undertook capital cooperation with Esso Eastern.

The Mitsubishi group (in cooperation with Getty Oil) consists of Mitsubishi Oil and Tohoku Oil.

The national group:

The Kyodo group consists of Kyodo Oil, Nippon Mining, Toa-kyoseki, Ajia-kyoseki, and Fuji Oil. Kaghoshima Oil, belonging to a refinery complex, has also joined the Kyoseki group. Kyoseki Oil, founded in 1965 as a "quasinational policy company," was a combination of "an oil company without a refinery" and "an oil company without a sales department," so the company could not keep pace with other companies of the group and did not do very well in spite of the all-out support rendered by MITI. Following the takeover of Toa Oil, which was loaded with an accumulation of debts, by its business rival Showa Oil, as mentioned previously, in January this year, the problem concerning the capital cooperation between Daikyo Oil and Ajia Oil was solved within 7 months (Daikyo bought 48.7 percent of the Ajia stock from Mitsubishi Chemical Industries). Ajia Oil thus left the Kyodo group and joined the Daikyo group. Two of the "three arrows" comprising Kyoseki at its inception were withdrawn, and the image of "Nikko-Kyoseki" is getting stronger.

The Shukko group consists of Shukko Industries, Okinawa Oil, and Toho Oil. Shukko as a single enterprise has the largest crude treating capacity in the entire industry. As a group, it holds approximately 15 percent of the sales share; alone, it occupies the second place nationwide. Shukko used to purchase crude oil from a number of majors including Exxon, Gulf, and BP. Its flexible crude oil purchasing policy caused trouble during the oil shock. Therefore, by establishing an office in Kuwait it is making an honest effort to reorganize its information collecting system, to cultivate the oil men, and to improve communications with the oil-producing nations in order to shape up its crude oil procurement system. The true power of Shukko is said to be so strong that it does not need the assistance of a trading company.

The Daikyo group consists of Daikyo Oil and Ajia Oil. In addition to having business cooperation with Fuji Industries of the national group which deals mainly in refining of heavy oil and lubricating oil, Daikyo Oil also handles the sales of a portion of oil products manufactured by Kagoshima Oil and Fuji Oil. Daikyo is the number three enterprise of the national group and is respected for its steadfast management. It has also kept a very close relationship with the Industrial Bank of Japan in matters related to personnel as well as capital. It is at the nucleus of an idea concerning the reorganization of oil companies of the Industrial Bank group. On the other hand, for the time being, although Ajia Oil belongs to the Daikyo group as far as capital is concerned, it is obliged to sell all or more than half of its products through the Kyodo Oil outlets, a desperate measure.

Another group consists of Kyushu Oil, Taiyo Oil, Nippon Paraffin Refinery and Teikoku Oil. Kyushu Oil was brought face to face with a grave situation: a complete stoppage of crude oil supply to Japan by BP and a severe cutback in crude oil supply by CF (French oil) and Exxon. It now relies on the large trading firms for its crude oil supply. Confining its sales regions to the Tokyo and Kyushu areas, Kyushu Oil is known for the efficient management carried out by a small number of crack units. However, as long as it has a crude oil purchase bottleneck, it is questionable how long it will be able to maintain its independence. Japan's largest paraffin producer, Nippon Paraffin Refinery, which belongs to the Japan line, is building up a close relationship with a Koa Oil, which belongs to the Caltex group, Teikoku Oil remains to the end Japan's number two oil and gas manufacturing company, and its crude oil refining share is only on the order of 0.1 percent.

Consideration of Reorganization and Conception of Japanese Majors

The problems tackled by the oil industry go beyond those related to the 36 oil refineries and original sales companies, because this basic energy industry involves, in addition to the government, the organizations responsible for maintaining a stable crude oil supply such as the consolidated trade company, Petroleum Public Company and Oil Development Company, together with the import and sales companies of LPG, the financial circles which take in approximately 600 billion yen a year in interest from the oil companies, and the maritime transportation companies which carry 90 percent of the primary energy consumed in Japan. Therefore, whenever "reorganization" of the oil industry has come up, not only those directly involved but also those indirectly involved have been caught in a whirlpool of consideration and apprehension, and no large-scale reorganization plan could progress beyond the state of a "blueprint."

Nevertheless, in order for Japan's oil industry to be able to tackle many difficult problems in this period of excitable international oil situation, and to plot survival strategy by intensifying decisions on operational intentions, the industry must not only promote inter-enterprise cooperation in order to increase efficiency and rationalization but also undertake the task of reorganizing the industry the merging of enterprises. Since the first oil shock, various business cooperation deals have been worked out in oil industry circles by going outside the boundaries of the conventional groups. The time has come when the narrow groupism is no longer fashionable. "Gentle business cooperation" has been pushed forward one step further by both the foreign capital group and the national group, and cooperation in the field of crude oil import has ranged from business cooperation, jointly owned tank locations and jointly owned oil tankers, to planning for the construction of jointly managed refineries. Therefore, reorganization of the industry involves untangling the web of these complicated relationships. Some threads must be strengthened while others must be cut. A member enterprise of a group concluding a capital cooperation pact with a "business rival," such as the drama played by Toa Oil and Ajia Oil breaking away from the Kyodo group, may be construed as a prelude to an honest to goodness drama of reorganization which has been smoldering for a long time.

MITI, which plays the major role in the drama of industrial reorganization, has two mainstreams--a "national faction" and an "international faction"--and under an administrative directive without clearly written law as its backing, many cases in which sharply different views were taken by the two factions have cropped up. Partly because the "international faction" has been in the mainstream recently, MITI has made its stand clear: "It will no longer shoulder the burden of ordering the reorganization, but will wait for the time to ripen in the private sector." It appears that there was an intention to lead the oil industry, which is like a jungle, into the "open."

However, the event will not take place according to plan if the weak constitution of the national group oil companies, which are expected to be the nucleus of the consolidated energy strategy, is exposed too plainly to view. In the meantime, the ministry will watch closely the natural progress of the inter-enterprise cooperation which is to mend the overly competitive nature of the industry. Under the premise that in tackling such a gigantic theme, governmental assistance, backing, regulation and inducement are indispensable, MITI should take advantage of this opportunity, when a sweeping change in the present defective "oil industry law" is to be implemented, to reorganize the scattered oil companies into groups, each consisting of three or four companies, by promoting conversion to a consolidated energy enterprise and cooperation with the oil-producing countries, so that a domestic system (new oil policies) which is capable of coping with the changing international oil situation may be built. If this were done, it is even imaginable that the entire national group of oil companies might be reorganized and wrapped up into a single unit depending on the situation of crude oil.

On the other hand, we are convinced of the tremendous persevering strength of the U.S. majors, and the voices advocating formation of an international cohesive company (Japanese major) which would be capable of developing long-range energy strategy are getting stronger. Since the revision of the "Petroleum Public Corporation Law," the Petroleum Public Corporation has now become an organization in possession of the functions of a cohesive company. Therefore, there is a plan to form a joint "public corporation -Japanese major" by combining the Kyodo group with the public corporation, with the latter as the nucleus. In any case, the outlook appears to be filled with difficulties.

Industrywide Reorganization

Tokyo TOKI NO KEIZAI in Japanese No 298, Jul 81 pp 100-103

[Article: "Destination of the Industrywide Oil 'Reorganization' About Which Only Desk Theories Have Been Heard So far"]

[Text] Oil provides 75 percent of the primary energy consumed in Japan, and 99 percent of the oil is imported. Therefore, the performance of the oil industry is constantly affected by crude oil procurement, refining and sales volume, and the exchange rate movement. Recently, the effect has become even more pronounced.

Take those companies which settle their quarterly accounts once a year (Nippon Oil, Maruzen Oil, Mitsubishi Oil, Koa Oil, Fuji Industries and General Sekiyu), for example. Their operating profits on a half-term basis in the previous quarterly mid-term settlement of accounts in September was 6.7 times greater than the same period of the previous year, but the latter half-term hit a depression and an overall loss in profits was experienced.

Originally, the significant increase in profits realized in mid-term was due mainly to a profit on the exchange rate difference. Except for the foreign capital group (especially the Aramco group), which was able to purchase crude oil relatively cheaply, all the other companies were almost in the red economically. In the latter period, the rise in crude oil price was accompanied by a bearish demand, and while the "price rise reflecting the cost standard" implemented since February this year has not yet had time to sink in, bitter competition in gasoline and the intermediate products ensued, and the business performance could not help but become sluggish.

The 1981 business performance, in contrast to the bright crude market, is full of pessimistic material. Although the domestic fuel oil demand is expected to pick up again, large growth cannot be expected. The "C-heavy oil bottleneck" cannot be expected to be resolved soon, so it is going to have an adverse effect on product prices. In addition, as a result of the high interest rate in Europe and America, the exchange rate of yen remains low, so that an exchange rate differential advantage cannot be expected either.

Indeed, individually, a significant difference has surfaced between the foreign capital group and the national group, influenced strongly by the source of crude oil. The foreign capital companies of the Aramco group are especially powerful. For example, according to the settlement of accounts made in December last year, the total sales volume of Esso Standard Oil amounted to 1,069,600,000,000 yen (an increase of 54.9 percent over the previous year ratio) with ordinary profits of 42.5 billion yen (an increase of 218 percent over the previous year ratio), setting a historic high record. The dividend rate also doubled, from 48.5 percent per year in the previous period to 98 percent per year in this period. Mobil Oil, like Esso, also set a record high in the total sales volume of 1,117,200,000,000 yen (an increase of 55.0 percent) and ordinary profits of 33.2 billion yen (an increase of 61.0 percent). Shell, as a non-Aramco member of the foreign capital group, did not fare so well. According to the settlement of account of the oil department of the Shell group in Japan (Shell Industries, Shell Oil and Shell shipping jointly), in spite of a rise in the total sales volume, which came to 1,441,200,000,000 yen (an increase of 45.2 percent), as a result of the increase in the crude oil price their ordinary profits were only 10.9 billion yen (a decrease of 22.4 percent).

These trends have become very conspicuous among Japan's oil companies. For example, the ordinary profits of Nippon Oil of the foreign capital group dropped from 75 billion yen in the mid term, to approximately 35 billion yen in the last term; and General Sekiyu, from 21.7 billion yen to 6 billion yen. Yet these were the relatively mild cases. In contrast, Mitsubishi Oil of the same foreign capital group changed from 33 billion yen into red figures, while Maruzen of the national group fell in one swoop from 13 billion yen in the black to 30 billion yen in the red.

The oil refining industry today is no longer a facility industry which puts emphasis on the operation, with 94 percent alteration expenditure and 9 percent fixed expenditure, but is considered a "simple processing industry." The best policy to increase profits is to secure a large quantity of cheap crude oil.

However, according to industry circles, the difference in crude oil cost between the Aramco group and the non-Aramco group comes to 3-4 dollars a barrel. With this much difference in the crude cost, it is unavoidable that the difference in enterprises will grow even greater. Take the sixth oil price upward adjustment implemented in December last year, for example. The largest was 9,500 yen per kiloliter implemented by Kyodo Oil, and the smallest was 4,900 yen per kiloliter by Mobil Oil--a gap as big as 4,600 yen.

Kyoseki is by no means an isolated case; every company of the national group which does not possess an independent crude oil source is in the same boat. The national group has had to rely on the more expensive DD crude oil or the spot market crude oil, for which the price has remained inflated. Thus it is quite evident that the national group has lost its competitive edge.

Daikyo-Ajia Coalition as a Detonator

Amidst all this, the oil industry reorganization, which had been talked about frequently but had never materialized, loomed large. According to a report published by the Oil Problem Investigation Commission of the LDP in January this year, a sweeping reform of oil policy will be implemented, and at the top of this proposal was: "Reorganization of the oil industry will be pursued boldly." MITI, too, made public a policy in February: "Reorganization of the oil industry and strengthening of its constitution will be promoted by joining three or four companies as a group without distinction as to foreign capital group or national group."

The first act of the drama is already under way quietly and gradually. First of all, General Sekiyu of the national group joined the Exxon system, one of the world's greatest majors, in early 1979, and a coalition of Maruzen Oil and Kanzai Oil was formed in October of the same year. By the end of the year, the management rights of Toa Oil and of Toa-Kyoseki of the Kyoseki Oil group were transferred, respectively, to Showa Oil of the Shell group and Nippon Mining of the Kyoseki group. On the other hand, Ajia Oil of the Kyoseki group established an overall business cooperation including crude oil procurement and refining with Daikyo Oil, and the relationship further developed into capital cooperation by January this year.

For the time being, Ajia Oil has been obliged to take this "desperate measure" of selling the greater part of its oil products through Kyodo Oil as before while aligned with Daikyo Oil on matters related to capital. However, this irregular arrangement is not expected to last long. These two companies may gradually deepen their cooperation in the refinery and sales departments, and under certain circumstances, may even merge.

Daikyo-Ajia Oil has a daily refining capacity of 480,000 barrels, amounting to more than 8 percent of the refining share, and comes to occupy third place in the national group, after Shukko Industries and Kyoseki, excluding Maruzen Oil. This has had a significant impact on companies like Maruzen, Fuji Industries and Taiyo Oil, which are suffering from low profits as a result of weak crude oil purchasing power and excessive debt. The future of these companies, as well as of Mitsubishi Oil and Showa Oil, which belong to the non-Aramco foreign capital group, are being watched closely.

What is surprising in this case is the move by the Industrial Bank, which is the main bank of Daikyo Oil. It has been persistently rumored that it was the Industrial Bank which acted behind the scenes in the Daikyo-Ajia coalition. The rivalry between Kyoseki and Daikyo over Ajia Oil appears to have a strong coloration of a "war of representation between MITI and the Industrial Bank." President Nakayama of Daikyo insists: "Our company has never acted according to the command of the Industrial Bank. Besides, the Industrial Bank is the main bank for both Daikyo and Kyoseki, so it would not take sides."

However, the Industrial Bank has its say in business circles because of its special position in the financial world. In fact, in the past it was instrumental in the reorganization of iron and steel, maritime transportation and automobile industries. The leader of the bank made his views quite clear: "It is desirable to reorganize the oil companies of the national group into a few groups, consisting of Shukko Industries as one group and two or three other groups formed from other companies." In fact, the idea concerning a Maruzen-Daikyo-Ajia coalition was advanced on the initiative of the Industrial Bank. The drama unfolded by the capital cooperation between Daikyo and Ajia is no doubt an extension of the idea advanced by the Industrial Bank, so the future of Maruzen, which is struggling to rebuild, is being watched closely.

The Dreams of "Japanese Majors" Die Hard

The other driving force for the reorganization, needless to say, is MITI. To be sure, MITI's stance toward reorganization has changed significantly over the past 10 years. The wait-and-see attitude taken by the ANRE during the recent Daikyo-Ajia coalition speaks of the changed situation, in which the government agency cannot afford to be completely pro-Kyoseki.

Historically, the consolidation of Kyoseki argument reached its peak when Minoru Masuda (now consultant to the Bank of Tokyo) was the secretary of the ANRE with the "nationalization of oil company argument" proposed by then president of Kyoseki, Ryutaro Hasegawa. This argument advocates the consolidation of both refining and sales of Kyoseki by transferring the oil stocks of Ajia Oil and Toa Oil to Kyoseki in order to strengthen direct control over the refining companies of Kyoseki. However, Nippon Mining, which was obliged to separate minerals from rocks, objected, and the plan was dropped by the time, the baton was passed from Masuda to Hashimoto (now consultant to the bank of Nagasaki) as the secretary of ANRE around 1976.

Later on, the policy was changed clearly during the term of secretary Tenya (from June 1978 to August 1979, now MITI councilor). During this period, the "Kyoseki Mistake Argument," which held that the organization of Kyoseki in itself was a mistake, sprang up and the traditional policy of protecting the national group while being hostile to the foreign capital group was turned around 180 degrees: "The cat (oil company) that can catch the mouse (crude oil) is the good cat no matter whether it is a black cat (foreign capital group) or a white cat (national group)." Crude oil procurement became the most urgent problem since the second oil shock, and we could not afford the luxury of discriminating between the national group and the foreign capital group.

When the oil policy of MITI changes, Kyoseki cannot help but change. In fact, the change has already begun to take place. The change is in the direction of breaking off from the original sales format and establishing the leadership of the Kyodo group by procuring crude oil by itself and distributing it to the refining companies. Under the leadership of President Obori, Nippon Kyodo Genyu was made a subsidiary company last year, and an import department was newly organized. Early this year, a London office was opened, and a system for securing DD crude oil is taking shape at a rapid pace, and remarkable results have been achieved. The greatest victory so far includes a contract to import Saudi Arabian crude oil at the rate of 150,000 barrels a day for 31 months starting in June last year.

This "Obori crude oil" amounts to 20 percent of the crude oil processed by the Kyoseki group, so that the crude oil cost for Kyoseki today, excluding the foreign capital companies of the Aramco group, is lower than Maruzen, Shukko, and Daikyo of the national group.

However, there are some who raise the question of the "Kyoseki eight-item notification" published in August 1969 with regard to the functional expansion of Kyoseki. There are also voices criticizing the "Obori crude oil" saying: "MITI must be working in the shadows. The GG crude oil of Saudi Arabia has been changed to DD crude oil for the Kyoseki group in Japan. Sooner or later a problem will develop."

However, in today's oil situation, "anybody who is capable of securing cheap oil belongs to the government army." Even those companies belonging to the foreign capital group would suffer cutbacks in crude oil supply if the trading rights of the parent company were revoked by the oil-producing countries. The crude oil supply to the national group which does not belong to any system was long ago reduced drastically by the majors, and the procurement of DD crude oil became the most urgent business. Any company incapable of doing this may not be able to survive, and will therefore be obliged to join hands with those who can. Whether such a coalition will take the form of a merger of a looser cooperation depends entirely on the circumstances. No doubt Kyoseki has taken action in anticipation of such a period.

Therefore, reorganization in the future will no doubt address itself to dissolving production-sales gaps, but the crude oil procurement power will remain the most important factor. The greatest motivation for Daikyo to form a coalition with Ajia lay in the fact that a small (crude processing) capacity constitutes a great handicap in negotiating the DD trade with the oil-producing countries.

Moreover, before consolidation, Ajia Oil was to receive 40 percent of the total oil supplied by Mobil over a period of 18 years, beginning in 1973. The fact that Ajia Oil was in such a relatively favored position was probably another attraction.

The time has come when reorganization cannot be discussed without touching upon the upstream (crude oil development). In fact, reorganization of the downstream (sales and refining) is a minor affair compared with the violent movement upstream.

According to well-informed circles, an idea concerning the unification of Petroleum Public Corporation, Oil Resource Development and Arabia Oil, or unification of Japan's oil-development business, is gaining popularity in part of MITI. This may be called a "great petroleum public corporation design." This new public corporation would also handle the GG crude oil, the supply of which is expected to increase in the future, and it would be positioned at the center of the upstream department of Japan's oil industry.

Of course, if this upstream company were formed, a downstream company as its receiving end would become necessary. In the present circumstances, Kyoseki would be highly likely to become this receiving end. If so, it is also probable that the Kyoseki group would be expanded further, and the participation of other companies might also take place. If so, the dream of "Japanese major design" held so long by the bureaucrats of MITI might become a reality after all.

On the other hand, there is a movement centered around the Industrial Bank which holds: "Doing so would diminish vitality and there would be a danger of it (the new public corporation) becoming the second Kokutetsu (national railway). The public corporation should support the private sector by raising the limit of investment and funding," thus insisting that reorganization of the oil industry be carried out in such a way as to vitalize the private sector. The trend set by the Daikyo-Ajia coalition may unite other companies of the national group and a second Kyoseki group may be formed.

Even Nippon Oil Cannot Be an Exception?

However, even the companies belonging to the foreign capital group are not necessarily secure as far as crude oil procurement is concerned. Therefore, depending on the turn of events, some of these companies may have to throw themselves into the whirlpool of reorganization. The events evolving around Okinawa Oil Refinery which, after its crude supply from Gulf was cut off, became a subsidiary of Shukko Industries (originally, Shukko and Gulf owned 45 percent each), is symbolic of the things to come. The move made by Fuji Oil in July last year, making Arabia Oil the chief shareholder of the third party allotment, was carried out with an eye to securing a stable crude oil supply.

In this sense, even Nippon Oil is not outside the boundaries of reorganization. Last year when a "significant cutback in crude oil supply by Caltex" became the topic of conversation, a rumor was circulated among some people that "Caltex might be withdrawing capital from Nippon Oil." Although this report turned out to be no more a rumor, it is a fact that Caltex has for some time urged the Nippon Oil group to "try to achieve independent crude oil procurement." Therefore, Nippon Oil opened field offices in London and the Middle East last year and began to gather information and to secure DD contracts. Since it relied completely on Caltex for its crude oil supply for so long, it lacks the business showing, so there is a world of difference between its pipelines to the oil-producing countries and those of Shukko. Let us assume that Caltex were to break off from Nippon Oil; where could Nippon Oil go?

"Nippon Oil is not on good terms with the companies of the national group, but it is on good terms with the Petroleum Public Corporation because of its business showing in oil development; if it severed connection with foreign capital, it would probably buy the idea of Japanese major design" is the view held strongly by many. The addition of Nippon Oil, which is famous for its exceptional sales power, to the "new public corporation" would make the latter doubly powerful. To be sure, this is merely a conjecture based on the unlikely assumption that Nippon Oil might disassociate itself from the foreign capital group.

Another argument that has been proposed concerning Nippon Oil is its merger with Maruzen. This idea is based on a belief that no one except Nippon Oil is capable of absorbing worn-out Maruzen. The idea is: after separating Maruzen's two low productivity companies--Matsuyama and Shimazu Refineries--from Maruzen as a separate company, Maruzen would be merged with Nippon Oil. The main bank of Maruzen--Sanwa Bank--is said to be enthusiastic about this scenario. If Nippon Oil were to embrace Maruzen, its sales share would exceed 25 percent, so it could become a stabilizing force of the industry. The question, however, is what to do about the crude oil supply. The supply from Caltex cannot be expected to increase beyond the present level, so it is up to the DD crude oil procurement power of Nippon Oil itself. Therefore, in the present circumstances, the chance for realizing this design should be considered small.

In any case, various oil companies, including the national group, whose operational foundation is crumbling under their feet must try to strengthen it first of all, and they must consider the option of reorganization in earnest as one of the possible survival measures. There is no knowing what impact this will have upon Japan's national economy.

9113
CSO: 4105/246

PROBLEMS OF CAUSTIC SODA INDUSTRY IN CONVERSION DISCUSSED

Tokyo KEIZAI TENBO in Japanese Vol 53 No 16 1 Sep 81 pp 60-63

[Text] Regardless of whether it is operating in the red, a Japanese soda company must make the conversion away from the mercury method by 1984. The larger makers have other interests and some margin of operation, but the medium and small makers are in a quandary trying to obtain capital to this end. It may be said that they will have to make an all-out effort. This situation makes imperative an industry-wide reorganization, but the difference between the different level companies is the cause of the situation, and the all-out cooperation which Asahi Glass has put into actual operation with Hokkaido Soda is a model case. A survival of the fittest reorganization seems to be in the making.

Ripples of the Asahi Glass-Hokkaido Soda Agreement

On 18 July last year the newspapers broke the news that Asahi Glass had taken over the operation of Hokkaido Soda, and it was reported that all the companies in the industry were agog with the news. This was because the largest maker of them all, Asahi Glass, regarded as the "eye of the typhoon," had finally made its move.

In the midst of the dire necessity for an industrywide reorganization due to the change in manufacturing method targeted for 1984, this is not only the first move in an actual attempt at this change but it also respresents a trend for weak makers to be absorbed by industries with strong marketing power and technological strength rather than the weak banding together, and those concerned are noting this.

Let us now look at the relationship between Asahi Glass and Hokkaido Soda. Needless to say, Asahi Glass is the top industry in the caustic soda field and accounts for 9.2 percent of the total production. Furthermore, it is not only engaged in production of caustic soda but it is also a high-yield industry, being a top glass maker, and has outstanding physical facilities.

In contrast, Hokkaido Soda, which was established in 1959 through capital advanced by industries located in Hokkaido such as Sanyo Pulp, Oji Paper, and Nippon Light Metal together with the Hokkaido Agency, is engaged purely in the production of caustic soda and chlorine. Before Hokkaido Soda was established, all caustic soda and chlorine had to be brought in from Honshu, but the impediments to transportation during the winter months caused such inconvenience that there was a joint capital subscription by concerned parties, making this a so-called province planned industry.

Initial operations were at the Horobetsu plant (monthly production capacity 2,600 tons) in Noboribetsy city where operations went smoothly, but a new large electrolytic facility was constructed in the form of the Kubomaki plant (monthly capacity 13,700 tons) in anticipation of the conversion law and increased production. This was accompanied by sales instability, financing problems, and cost increases that wreaked havoc with its business record, and it had accumulated a total debit of more than 3 billion yen as of the end of September last year.

This was why concerned parties requested all-out support from Asahi Class. According to some sources, Asahi Glass agreed to advance 200 million yen in capital in a third party role to become the second largest stockholder and take over product marketing rights as well as responsibility for actually running the business. At the same time, it was to introduce technological direction aimed at lowering the production cost of chlorine, which is produced along with caustic soda, and to take over the production of chlorine from Hokkaido Soda, which had been holding down production because of low demand, and thereby raise the operating efficiency.

With this overall cooperative process the production sites for soda and chlorine controlled by Asahi Glass will now include Hokkaido as well as Kanto (Chiba, Kashima), Kansai, and north Kyushu, giving this company a system extending over the entire country as well as increasing its share of the national level to 13.2 percent.

Weakness in Having Excessive Facilities Longlasting

Even so, there is not expected to be any concerted opposition to this tieup, which spans the framework of cooperation, capital and financial areas, and it seems to be pointing the way toward other impending consolidations. Now, why is an atmosphere of reorganization being cast over the soda industry? One of the reasons that can be cited is the trend for the soda industry to build excessive facilities while being a low profit industry.

Ever since the first oil shock, demand for soda has been crawling along at a rate of about 3 million tons per year. On the other hand, the production capacity is on the order of 4.5 million tons, and the present situation is that the industry is operating at about 60 percent of capacity.

There are 34 makers in this field spread over the entire country, but all the large makers are not limited simply to the production of soda, and they each have a share of less than 10 percent, making for a dogfight situation and of necessity putting the industry itself in a situation difficult to resolve.

At the same time, movements in the demand for chlorine which is produced along with the soda can sometimes result in excess soda or even a lack of soda. Since last year, the demand for chlorine by vinyl chloride makers, which represent the principal outlet for chlorine, has been unstable, and excess chlorine accompanied by lack of soda is the situation that has continued. In other words, the tie-in with the chlorine produced at the same time has made supply adjustment extremely difficult.

In addition, the soda demand sources are not alway reliable. Industries such as chemically produced artificial fibers, stable fiber, paper, pulp, aluminum, and sodium glutamate are in a depressed state, and even though this is a basic chemical, any increase in volume is taking place at a very slow tempo.

Now, the factor most responsible for making the soda business such a low-profit business is that soda itself has very low add-on value. As is common knowledge, caustic soda is produced by the electrolysis of salt water, and about 50 percent or more of the production costs go into the electric power consumed. This is a model multiple-energy-consuming type industry. In other words, it is an industry which bears the full brunt of the high cost of electric power, and while the industry on the average produces nearly 60 percent of its own power, this, too, is beset with the high cost of oil. As a result, the industry has poor international competitive strength, which is to be expected. The need to use electric power at the highest cost in the world is an extreme handicap, and the advent of the Dow Chemical Company of the United States into the Japanese area comes from such a background.

Dow Chemical has indicated its plans to introduce 200,000 tons of soda per year along with ethylene dichloride (EDC) and vinyl chloride monomer type chlorine family products in Japan, and it is said to be planning to construct tank facilities in Japan to store these products by 1983. Its strategy is that it can compete even though it has to ship its products from the United States.

A certain industrial executive said: "I do not believe that the effect of Dow's advent will appear too great, but it becomes necessary for the Japanese makers to at least undertake CIF, or in other words, wield a large knife to pare costs down to a level at which they can compete on an international level. If this cannot be done, there will be a catastrophe in price and statistics. Any make with resolve must expand facilities at the time of conversion and pull his costs down.

To be sure, it is said that "Asahi Glass as the leading company is capable of competing on an international level even with the barrier membrane method, and it will be even more capable with the ion-ecxhange membrane method." On the other hand, this situation is limited to a large industry with well-established in-house technology, and it may be said that the majority of the industry is in a state in which it has no international competitive strength.

The situation at present is that there is not only excessive competition between domestic makers, but external pressures are also beginning to mount.

The Impending Limit To Conversion of Manufacturing Method

One of the factors said to be spurring reorganization is the problem of conversion in manufacturing method. This problem of conversion in manufacturing method from the mercury method to the barrier membrane method and then to the ion-exchange membrane method is associated with the deadline "by the end of 1984." It is accepted that the mercury facilities will all be converted by that time, but the finances involved in this conversion are monumental, and this is though to be tied in with this industrial reorganization concept.

First of all, taking a look back at the history of this conversion in manufacturing method problem, it was 8 years ago, in 1973, when the government decreed the plan to convert plants operating with the mercury method to the barrier membrane method. Under this decree, the industry was to convert two-thirds of its capacity from the mercury method by FY-81 in a first-stage effort. The remaining one-third of the facilities are to be converted by 1984 in the second-stage conversion.

On the other hand, the barrier membrane method which was adopted in the first stage developed problems involving the quality of the caustic soda it produced as well as energy cost, and the new ion-exchange membrane method is coming to the fore. This new method produces a product which is not inferior to that of the mercury method but also incorporates the advantage that its energy costs are 15-20 percent lower, so that it has come into the limelight, and conversion to the ion-exchange membrane method rather than the barrier membrane method is at present the mainstream effort.

Only five companies--Asahi Chemical Industry, Asahi Glass, Tokuyama Soda, Kanegafuchi Chemical Industry, and Toyo Soda--have developed this new technology, and the other companies have fallen into the situation that they must rely on these companies for the technology.

According to a survey by the Japan Soda Industry Association, of the 21 companies which still use the mercury method in their operations, with the exception of two large diversified industries, the remaining 19 companies will require a total of 28.5 billion yen in fixed costs per year if they completely convert from the mercury method to the ion-exchange membrane method, and the conversion will completely wipe out any profit.

This is why this conversion will not be completely satisfactory except for a fraction of the large makers such as Asahi Glass, according to present estimates. Even the Ministry of International Trade and Industry says: "Almost all of the industry is hoping for total conversion by 1984, but there are some who will balk at this conversion and content themselves with simply eliminating their mercury facilities."

To be sure, the presently used mercury method facilities are closed affairs which have eliminated the risk of creating pollution problems, but on the other hands the manufacturing process itself has reached the stage where the optimum technology has been achieved. For example, the SPE method, which is considered superior to the ion-exchange method and which was developed by the Italia Daler Company, has come to the fore, and there are some whc in analyzing the situation say that this could be a major factor which will greatly delay this conversion.

In any event, this deadline is approaching, and each maker is beset with the problem of what to do with his remaining mercury facilities. If the conversion is to be made, the time to do so is rapidly approaching.

On the other hand, there is the feeling that "the companies which will achieve any great benefit from conversion to the ion-exchange membrane method are possibly only Asahi Glass, Toyo Soda, and Tokuyama Soda, and all the others eventually will be wiped out" (industry communication) pervading the present situation.

Is This a Revamping of Survival of the Fittest?

Looking at the capacities of the soda industry members, Asahi Glass tops the list with a share of 9.2 percent, followed by Toyo Soda with 8.8 percent, Tokuyama Soda with 7.3 percent, Toa Gosei with 6.1 percent, and Kanegafuchi Chemical with 4.6 percent.

Among these companies, Asahi Glass accounts for 53 percent of the glass sales, which is its main line, so that it can readily cover the low profit from soda. Toyo Soda also makes resin products such as vinyl chloride as well as cement and fine chemicals. Tokuyama Soda accounts for 42 percent of cement sales, which together with soda production provides it with two pillars to work on, and it is leading in the new technology of the ion-exchange membrane method.

According to an industry communication, "Asahi Glass heads the list of those aiming at 1984, while slightly behind it are Tokuyama Soda and Kanegafuchi Chemicals which make up the second group. The companies which lag behind include those which are pondering whether this is the proper course to follow while they tag along."

In addition, a certain industrial executive said: "It probably will be the situation from now on that either the large or the medium and small industries will be the only survivors. An industry whose production volume and siting conditions are inadequate cannot help but perish," is his prediction.

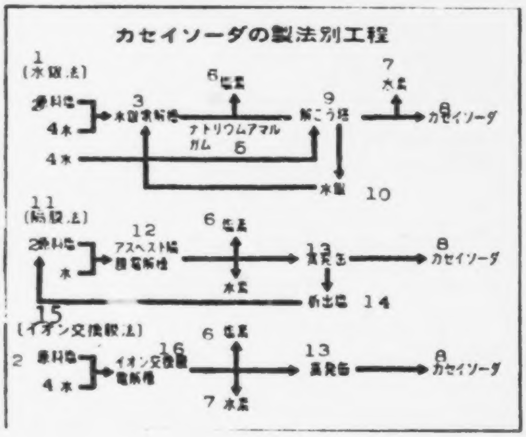
The gap between the large makers with technological and financial strength and the medium and small makers is forever increasing. Furthermore, the environment in which this industry is placed is one in which any small-scale effort is doomed.

The statement by Dow Chemical that "Japan's caustic soda industry is beset by energy, raw material, and siting problems such that producing soda in countries with cheaper costs and transporting it to Japan where this product can be used as the base to make products of add-on value will be cheaper" attests to this situation.

In this respect Japan's large makers, particularly Asahi Glass, say with determination: "Any further increases will have to take place in foreign lands such as Canada and Australia, where energy cost is cheap" as they reveal their plans for overseas expansion.

Setting aside electrolytic facilities used to provide products for in-house use, the time has come when a company must set out for foreign lands if it is to survive. It seems that industries which are lacking in competitive strength will have to come under the umbrella of stronger companies or take up contract production, and the Asahi Glass-Hokkaido Soda arrangement appears to be the opening wedge in this direction.

Caustic Soda Production by Different Processes


カセイソーダの製法別工程
1 （水銀法）
2 原料塩
4 水
3 水銀電解槽
6 塩素
ナトリウムアマルガム 5
9 解こう塔
7 水素
8 カセイソーダ
4 水
10 水銀
11 （隔膜法）
2 原料塩
水
12 アスベスト隔膜電解槽
6 塩素
水素
13 蒸発缶
8 カセイソーダ
14 析出塩
15 （イオン交換膜法）
2 原料塩
4 水
16 イオン交換膜電解槽
6 塩素
7 水素
13 蒸発缶
8 カセイソーダ

Key:
1. mercury method
2. raw material salt
3. mercury electrolytic cell
4. water
5. sodium amalgam
6. chlorine
7. hydrogen
8. caustic soda
9. amalgam decomposition tower
10. mercury
11. barrier membrane method
12. asbestos barrier membrane electrolytic cell
13. evaporating pot
14. precipitated salt
15. ion-exchange membrane method
16. ion-exchange membrane electrolytic cell

2267
CSO: 4105/245

END

JPRS 79604

7 December 1981

Japan Report

No. 138

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79604

7 December 1981

JAPAN REPORT

No. 138

CONTENTS

MILITARY

Japan, U.S. To Cooperate in Military R & D
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81)........................ 1

JDA To Conduct Joint Study With U.S. on Patriot
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81)........................ 2

JDA Starts Construction of Central Command System
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81)........................ 4

ASDF To Name 220 Men for E-2C Deployment
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81)........................ 5

GSDF, ASDF To Seek CH-X Funding in FY 1983
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81)........................ 6

ASDF Requests 1,300 Missiles for Fighters
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)........................ 7

Second Buffer System for ASDF E-2C
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)........................ 8

MSDF To Acquire Six New PG's by FY 1990
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)........................ 9

G/MSDF Requests 13 Chukar II Drones in FY 1982
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)........................ 10

First Ju-MAT Missiles To Be Deployed in Late FY 1981
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)........................ 11

ASDF To Fix New Badge Program in May 1982
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81)........................ 12

ASDF To Unify 20mm Guns Into VADS
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81)........................ 13

[III - ASIA - 111]

MSDF Adopts MK-46 as New Short-Range Torpedo
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81).......................... 14

Japan, U.S. To Exchange Defense Technology Experts
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 15

ASDF To Set Up Ad Hoc F-15 Squadron in December
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 17

ASDF Planning To Introduce CH-47 Helicopter
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 18

ASDF To Lengthen Nike-J's Service Life
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 19

JDA To Set Up New Radar Installations at Two Sites
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 21

ADSF Preparing for E-2C Introduction
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 22

SDF Helicopter Survey Team To Visit U.S. in FY 1982
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 24

Arms Standardization Affecting Government's Tank Plan
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 25

ECONOMIC

Current Trends of Foreign Investment Into Country Analyzed
(DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY, No 163, 1981)......... 26

Conflict Between Postal Savings, Banks Continues
(JIHYO, Oct 81)... 30

SCIENCE AND TECHNOLOGY

FY-80 Science, Technology White Paper Summarized
(KAGUKU SHIMBUN, 7 Aug 81).................................. 35

FY-82 Budget Estimate for Science, Technology Given
(KAGAKU SHIMBUN, 11 Sep 81)................................. 39

Current Trends of Technical Cooperation Discussed
(Kaoru Honjo; DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY,
No 163, 1981)... 44

JICA's Technical Cooperation Reviewed
(Kiyoshi Isaka; DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY,
No 163, 1981)... 48

Government Decides on Basic Energy Actions
(JAPAN PETROLEUM & ENERGY WEEKLY, 28 Sep 81).................... 52

Electric Utility To Start COM Burning in Power Plants
(JAPAN PETROLEUM & ENERGY WEEKLY, 21 Sep 81).................... 56

Measures To Promote Electric Power Plant Construction Projects
(JAPAN PETROLEUM & ENERGY WEEKLY, 5 Oct 81)..................... 60

SJAC Team Leaves for Southeast Asia
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 65

MITI To Develop Composite Matetial Technology
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 66

Sumitomo Develops New Stringer Manufacturing Process
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 67

Three Firms Working on Badge Proposals
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 68

Steel Works Named for Vulcan Modification
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 69

Partial Fabrication of GRX-3 Torpedo To End in FY 1982
(JPE AVIATION REPORT-WEEKLY, 7 Oct 81).......................... 70

MITI Advisory Body To Study Y-XX Partner
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)......................... 71

Keidanren Studying Military Technology Transfer to U.S.
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)......................... 73

JDA To Sign MT-X Contract With KHI by Mid-October
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)......................... 74

C-130H Overhaul Contractor To Be Selected Soon
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)......................... 75

JDA To Select Prime Contractor for AW-X Development
(JPE AVIATION REPORT-WEEKLY, 14 Oct 81)......................... 76

P&W, GE Make Specific Proposals To Join RJ500 Program
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81)......................... 78

Nation's Aircraft Material Output Still Insufficient
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81)......................... 80

Major Military R&D Programs Projected for FY 1982
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81)......................... 82

TR&DI To Design Aircraft System Simulator in FY 1982
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81).......................... 85

TR&DI To Develop New Target Drone by FY 1986
(JPE AVIATION REPORT-WEEKLY, 21 Oct 81).......................... 86

Aircraft Industry Studying Three Y-XX Proposals
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 87

New Firm To Fabricate RJ500 Prototypes in FY 1981-1982
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 89

Shin Meiwa, NIPPI Will Not Participate in MT-X Program
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 90

Three Firms Vying for C-130H Airframe Overhaul
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 91

MITI To Develop Resources Survey Satellite
(JPE AVIATION REPORT-WEEKLY, 28 Oct 81).......................... 92

Seventh RRJAEL Broad Meeting Held in Tokyo
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 93

CTDC To Draft Basic Y-XX Design by March
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 94

MT-X Program To Cost Forty-Three Billion Yen
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 95

CRX-2 Torpedo Development To Be Completed by FY 1984
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 96

Guided Weapons for R&D in FY 1982
(JPE AVIATION REPORT-WEEKLY, 4 Nov 81).......................... 97

MILITARY

JAPAN, U.S. TO COOPERATE IN MILITARY R & D

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 pp 5, 6

[Text]

Japan and the United States have agreed to promote joint research and development of weapons systems and military technologies apparently to standardize their defense equipment and increase their technological capabilities through exchange of engineers.

The agreement came at talks between Hiroshi Wada, Director-General of the Japanese Defense Agency's Equipment Bureau, and U.S. Undersecretary of Defense Richard Delauer in Washington Sept. 18, Wada told a press conference on his return from his U.S. trip in late September.

They also agreed that the two countries will discuss specific weapon and technology items for joint research ard development at their third regular consultation on defense equipment and technology in Tokyo by the end of this year, and conclude a governmental arrangement for such cooperation, Wada said, adding no specific research and development items have been proposed yet.

Apart from joint research and development, Wada said, he told the Americans that Japan can transfer its commercial technologies, which could be used for military purposes, to the United States. The Americans had requested Japan to supply the U.S. forces with its advanced technologies for military purposes.

When the U.S. request was made earlier this year, the transfer of military technologies to the United States was believed likely to violate Japan's arms export ban policy. But the Japanese government has judged the Japan-U.S. joint research and development of weapons as well as such technology transfer would not run counter to the arms export ban policy.

CSO: 4120/60

JDA TO CONDUCT JOINT STUDY WITH U.S. ON PATRIOT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 pp 6, 7

[Text]

The Air Self-Defense Force (ASDF) and the Ground Self-Defense Force (GSDF) are expected to conduct a joint study with the United States on their possible introduction of the U.S. Army/Raytheon Patriot surface-to-air missile (SAM) system in the second half of FY 1982 after signing a memorandum of understanding (MOU) and a foreign military sales (FMS) contract with that country on the study in the first half.

The Patriot has been considered as a promising candidate for the two services' SAM-X system to replace the ASDF Nike-J and the GSDF basic Hawk.

Although the two services have so far collected data on the Patriot through dispatch of missions to the United States, their survey team, sent last spring, acknowledged that no progress is likely in their survey on the U.S. missile unless they conclude the MOU and FMS contract to conduct the joint study with the Americans. West Germany has carried out a similar study with the United States on the same missile.

Based on the survey results, the two services have earmarked a total of ¥500 million in the JDA's FY 1982 budget request for the joint study with the Americans. They plan to send three officials each to the United States for the study.

If the study is implemented as scheduled, the JDA could make a final decision on the introduction of the SAM-X by the end of FY 1983 to start funding of the new SAMs in FY 1984. The decision would also involve whether the ASDF and GSDF should procure the same type simultaneously.

Although the GSDF considers only the Patriot as a replacement of the basic Hawk, the ASDF is studying the Nike-Phoenix as well. The Nike-Phoenix, now in research by JDA's Technical R&D Institute, is a mixture of the Nike-J and the Hughes Phoenix air-to-air missile system for the U.S. Navy/Grumman F-14 fighter. The ASDF has set aside ¥20 million in the FY 1982 budget request for this research.

But the ASDF's adoption of the Nike-Phoenix for the SAM-X is seen as unlikely, due to such problems as a long development period. The service is believed to be inclined to adopt the Patriot.

CSO: 4120/60

JDA STARTS CONSTRUCTION OF CENTRAL COMMAND SYSTEM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 p 7

[Text]

The JDA has started the construction of a two-story building at its site in Roppongi, Tokyo, to house a central command system for unified command of the three SDF services in emergency.

The central command system, under planning since FY 1977, is expected to become operational in September 1983.

The FY 1981 budget sets aside ¥2,000 million for the construction of the building, which will also have three underground stories. In its FY 1982 budget request, the JDA has sought ¥6,759 million for additional construction work and procurement of hardware equipment. Total cost for building the central command post is estimated at a range of ¥9,000 million to 10,000 million.

CSO: 4120/60

ASDF TO NAME 220 MEN FOR E-2C DEPLOYMENT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 pp 7, 8

[Text]

The ASDF plans to name about 220 servicemen in preparation for introduction of the Grumman E-2C airborne early warning aircraft in FY 1982, when the first two E-2Cs will be delivered to the service. These servicemen will be stationed mainly at Misawa and Iruma Air Bases prior to formation of warning flight squadrons.

Of these men, more than 10 will be planning personnel for such squadrons at Misawa Base. About 100 men will be attached to the Air Proving Wing to test the first two E-2Cs from the last quarter of FY 1982. This number of service personnel will be necessary because the E-2C's computer capacity is almost two times that of the current BADGE automatic air defense system.

At Iruma Base, about 50 men will form an E-2C program control group in addition to the existing BADGE program control group.

Another 50 men will be stationed at Misawa Base's air defense center to handle a communications buffer between the E-2Cs and the BADGE system, which the ASDF will acquire in FY 1982. Several more personnel will be needed for the E-2C program at the base's supply depot.

Meanwhile, the ASDF intends to elevate the Communications & Electronics Section of the Defense Department's Operations Division to a Communications & Electronics Division to undertake electronic warfare operations as well as management of the BADGE, the E-2C and surface-to-air missiles.

CSO: 4120/60

GSDF, ASDF TO SEEK CH-X FUNDING IN FY 1983

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 8, 9

[Text]

The GSDF and ASDF are expected to seek funding of their first CH-X new large transport helicopters simultaneously in FY 1983 with the same type selected, because the two services, intend to use the new helicopters for somewhat similar missions. A promising candidate for the CH-X helicopters is the Boeing Vertol CH-47-414.

The GSDF has agreed with the JDA's internal bureaus that its KHI KV-107 transport helicopters should be replaced by new larger models. Based on this agreement, the service intends to seek funding of the first two CH-X aircraft for training in FY 1983 and start a full-scale CH-X procurement program under the FY 1983-87 Medium-Term Defense Program (MTDP) to be drafted by the end of FY 1981 or March 1982.

Prior to the procurement, the GSDF has requested funds for a survey on selection of the CH-X to be disbursed in FY 1982.

The ASDF has prepared a plan to procure 12 CH-X helicopters -- three each for the four regional Air Defense Forces -- for transport of personnel and equipment to radar sites and other remote spots on the basis of a review of its overall transport setup. It had intended to start their funding in FY 1981. But priority has been given to funding of Lockheed C-130H tactical fixed-wing transports so that the CH-X program has been left over for the FY 1983-87 MTDP. The service now hopes to purchase eight CH-X helicopters -- two each for the four regional Air Defense Forces -- under the new MTDP, with the first ones funded in FY 1983.

The two services are believed likely to keep close consultation on their similar CH-X projects, acknowledging they had better adopt the same helicopter.

CSO: 4120/60

MILITARY

ASDF REQUESTS 1,300 MISSILES FOR FIGHTERS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 6

[Text]

The Air Self-Defense Force (ASDF) has sought ¥46,320 million to purchase some 1,300 missiles for fighters in its FY 1982 budget request, according to informed sources.

The procurement will include approximately 380 AIM-7F Sparrow air-to-air missiles (¥23,830 million) for the F-15J interceptor-fighters, 890 AIM-9L Sidewinder AAMs (¥18,600 million) for the F-15Js, and 30 ASM-1 antiship missiles for the F-1 support fighters.

Funding for these three types of missiles started in FY 1980. FY 1981 funding covered 168 AIM-7Fs (¥9,510 million), 171 AIM-9Ls (¥5,435 million) and 25 ASM-1s (¥3,165 million).

The ASM-1 has been developed and produced by MHI, while the AIM-7F is domestically produced under license with Raytheon. Funding for the Raytheon AIM-9L, in FY 1981 and thereafter will be subject to licensing for domestic production.

CSO: 4120/60

SECOND BUFFER SYSTEM FOR ASDF E-2C

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 6

[Text]

The ASDF intends to order the second communications buffer system for the Grumman E-2C airborne early warning aircraft in FY 1982, following the first system funded in FY 1980. It has already set aside ¥2,400 million for the second system in its FY 1982 budget request.

The system, proposed by Hitachi, Ltd. with technical assistance from Rockwell-Collins, will be used to link the E-2C flying radar to the BADGE air defense system.

The first buffer system is to be delivered to the ASDF by the end of FY 1983 for service at the Northern Air Defense Command. The second one is planned for the Western ADC. The ASDF is expected to request a third system for the Central ADC in FY 1983 and a fourth one for the Southwestern ADC in FY 1984.

CSO: 4120/60

MSDF TO ACQUIRE SIX NEW PG'S BY FY 1990

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 7

[Text]

The Maritime Self-Defense Force (MSDF) intends to acquire six new 250-ton PG patrol gunboats for two squadrons by the end of FY 1990 to replace the existing five 100-ton PT torpedo boats which will be retired at an annual rate of one vessel from FY 1986 to 1990. The first three new PGs may have to be procured by FY 1988 to make up for the retirement of that many PTs.

The MSDF has sought ¥2,788 million in its FY 1982 budget request to build a prototype PG for operational evaluation in FY 1983-84 prior to full-scale procurement. It hopes that all six vessels will be funded under the FY 1983-87 Medium-Term Defense Program now in preparation.

The MHI-proposed slide type is expected to be adopted for the new PG because Boeing's sophisticated computer-controlled hydrofoil type, proposed by Hitachi Shipbuilding & Engineering Co., could cost too much money, according to one report.

The new PG will be armed with the McDonnell-Douglas Harpoon surface-to-surface missile and the OTO Melara 76mm gun to undertake limited interception and coastal patrol missions. Its maximum speed is planned at more than 40 knots. If such speed is achieved with mounting of advanced electronic systems, the boat could be used for antisubmarine operations as well.

CSO: 4120/60

G/MSDF REQUESTS 13 CHUKAR II DRONES IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 pp 7, 8

[Text]

The Ground and Maritime Self-Defense Forces (GSDF and MSDF) have sought 13 Northrop Chukar II target drones in their FY 1983 budget request, following the first five units funded in FY 1981.

The 13 units comprise six for the GSDF and seven for the MSDF. The first five were comprised of one for the GSDF and four for the MSDF.

The GSDF plans to use the new drones for trainings in firing the Tan-SAM short-range surface-to-air missile, which the service is to introduce for air defense of GSDF divisions under the FY 1981 budget.

The MSDF intends to use such drones for the Sea Sparrow SAMs to be mounted on destroyers funded from FY 1975 to 1977.

The Chukar II drones will be produced by Nippon Electric Co. (NEC) under Northrop license. But knock-down units will be imported for assembly by NEC for the drones under FY 1981 and 1982 funding. Those for funding in FY 1983 and thereafter will be subject to full-scale license production.

CSO: 4120/60

MILITARY

FIRST JU-MAT MISSILES TO BE DEPLOYED IN LATE FY 1981

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 8

[Text]

The GSDF will deploy its first eight sets of Model 79 Ju-MAT antitank/ship missiles at its Second Division at the end of the current fiscal year, two years after the KHI-developed missile was given service entry certification in 1978. An additional four sets will be delivered to the Fuji School and one more to the Ordnance School later on.

The Model 79 Ju-MAT is an advanced version of KHI's Model 64 antitank missile, Japan's first domestically-developed guided missile. The semiactive infrared guided weapon can hit a target within a four-kilometer range at a speed of 720 kilometers per hour. It measures 156.5 centimeters in length and 15.2 centimeters in diameter, and weighs 42 kilograms. Its price is ¥10 million.

One Model 79 Ju-MAT set is comprised of two launchers, sighting apparatus, communication equipment and other components.

The Ju-MAT missiles will replace the GSDF's recoilless guns to attack landing-ship tanks as well as battle tanks.

CSO: 4120/60

MILITARY

ASDF TO FIX NEW BADGE PROGRAM IN MAY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 pp 3, 4

[Text]

The Air Self-Defense Force (ASDF) is expected to make a decision on the prime contractor and construction schedule for the new BADGE automatic air defense system by the end of May 1982, paving the way for the Japanese Defense Agency's (JDA) final decision in late July or early August before its FY 1983 budget request.

The ASDF requested Nippon Electric Co., Hitachi Ltd. and Fujitsu Ltd. last Aug. 7 to submit their proposals on the new BADGE by the end of January 1982. It expects to take about four months to evaluate these proposals before the decision.

The ASDF's decision will be studied by the internal bureaus of the JDA and the National Defense Council until the FY 1983 budget request is make up in late August 1982, when the JDA may seek funds to start construction of the new BADGE.

The ASDF is required to build the new BADGE with increased capability as early as possible to handle such sophisticated equipment as the F-15J fighter-interceptor, the E-2C airborne early warning aircraft and the SAM-X next-generation surface-to-air missile system.

The new BADGE construction program may be one of the ASDF's top priority projects under the FY 1983-87 Medium-Term Defense Program to be worked out by the end of FY 1982.

CSO: 4120/60

ASDF TO UNIFY 20MM GUNS INTO VADS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 p 4

[Text]

The ASDF is expected to procure only Vulcan Air Defense Systems (VADS) as its 20mm antiaircraft gun systems for air base defense, though it has so far considered not only the VADS but also a modified version of the 20mm Vulcan gun system aboard the retiring F-104J fighter.

The service is to fabricate and test two modified Vulcan systems through a private contractor under the FY 1981 budget. But it is unlikely to adopt the modified Vulcan system which has no fire control radar, because Japan's license production of the more advanced VADS is seen as possible.

It has sought funding of 16 VADS sets in its FY 1982 budget request on the basis of evaluation of four sets funded in FY 1979. Their license production will be undertaken by the contractor for modification of the 20mm Vulcan gun system.

The 20mm antiaircraft gun systems will be deployed at air bases and radar sites together with short-range and portable surface-to-air missiles. VADS procurement is expected to amount to about 350 sets.

CSO: 4120/60

MSDF ADOPTS MK-46 AS NEW SHORT-RANGE TORPEDO

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 p 5

[Text]

The MSDF has adopted the U.S. Navy MK-46MOD-5 short-range antisubmarine torpedo as the replacement for the Model 73 torpedo prior to full-scale procurement starting in FY 1982, although the modified Model 73 has been developed as the replacement.

The service had sought procurement of the modified Model 73 torpedoes in its FY 1982 budget request. But the U.S. Navy has agreed to release the MK-46 for Japan's license production, leading the MSDF to switch from the modified Model 73 to the MK-46MOD-5.

The U.S. Navy has approved Japan's license production of the MK-46MOD-5, except for the guidance system, in the immediate future. The torpedoes for FY 1982 funding will be subject to partial license production with the guidance systems imported. The guidance system is expected to be released in the late 1980s, enabling Japan's full-scale license production. MHI has been named to undertake the license production.

CSO: 4120/60

JAPAN, U.S. TO EXCHANGE DEFENSE TECHNOLOGY EXPERTS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 pp 7, 8

[Text]

Japan and the United States are expected to start their cooperation in military technology with exchange of technical experts on a governmental basis.

They may reach agreement on the exchange at their third regular consultation on defense equipment and technology scheduled for late this year, according to Japanese Defense Agency sources.

Recent talks between Japanese and U.S. defense officials included the working-level security consultation in Hawaii last June and JDA Equipment Bureau Director-General Hiroshi Wada's meetings with U.S. officials in Washington in September. At these talks, the Americans reportedly asked the Japanese to transfer Japan's advanced commercial electronic and optic technologies and to start joint research and development of defense technologies.

The Japanese see the exchange of defense technology specialists as the first step of Japan-U.S. governmental military research and development. Through the exchange, Japanese and U.S. experts could discuss technologies of common concern in detail and get to know each other's national technological levels and development capability. Thus they could work on technologies and arrangements for joint research and development smoothly.

One of the major topics for expert discussion would be how to promote interoperational capability of Japanese and U.S. defense equipment to contend with future emergencies effectively.

If the exchange of military technology experts makes smooth headway, the two countries could launch joint development and production of weapons systems.

On the subject of technology transfer, the Japanese have reportedly told the Americans that Japan can export commercial technologies for military purposes to the United States notwithstanding its policy of banning arms exports.

Although U.S. officials have yet to specify the Japanese technologies requested for the transfer, Japanese government and industry sources say that the know-how the Americans want includes ultra-high-speed integrated circuits (UHSIC) and low-loss fiber optic transmission cables, according to unofficial notices from the U.S. Department of Defense. The Americans may reveal the specific technological transfer requests at the defense equipment and technology consultation get-together later this year.

Japanese industry pioneered remarkable development of UHSIC and fiber optic technologies for commercial purposes in the 1970s; America failed to promote full-fledged development.

The UHSIC will bring about smaller-sized IFF (identification, friend or foe) and guidance systems for missile warheads and speed up data processing to improve the missiles' hit ratio. It will also sharply improve performance of fire-control systems aboard fighter aircraft and electronic warfare systems.

In the 1970s, the U.S. Department of Defense cut its subsidies to industry for development of the UHSIC, expecting the industrial sector to develop the technology on its own. But the private sector centered efforts on research into large-capacity memory chips rather than high-speed ICs, leaving the United States lagging behind Japan in the UHSIC field.

The fiber optic technologies have already been applied by the U.S. Air Force and Navy to communications systems of aircraft and submarines. But the Pentagon has been slow in making further progress in such technologies. In the meantime, Japan has taken the lead in development of low-loss fiber optic cables that enable large-capacity, long-range communications.

CSO: 4120/60

ASDF TO SET UP AD HOC F-15 SQUADRON IN DECEMBER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 pp 8, 9

[Text]

The ASDF is expected to inaugurate an ad hoc squadron of one F-15J fighter and two F-15DJ trainers in mid-December after approval by the Minister for Defense (JDA Director-General) on F-15J deployment.

The F-15J fighter for the ad hoc squadron is the first one produced by MHI under license by McDonnell Douglas Corp. (MDC), and will be delivered to the ASDF in December after on-going tests.

The two-seater trainers, now used in the United States for training ASDF pilots, will be transferred to Japan by U.S. Air Force pilots around Nov. 20.

Two F-15Js imported from MDC arrived at Gigu ASDF Base last March 27 for operational tests by the ASDF Air Proving Wing. A report on the tests will be submitted to the Air Staff Office in November. Based on this report, the ASDF Chief of Staff will file an application with the minister for approval of F-15J deployment.

When approved, the ad hoc squadron will be set up at Nyutabaru ASDF Base. The two F-15Js for the Air Proving Wing will continue to undergo testing. Japan's first formal F-15 squadron may be organized in the middle of FY 1982 with additional aircraft joining the ad hoc squadron.

CSO: 4120/60

ASDF PLANNING TO INTRODUCE CH-47 HELICOPTER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 p 9

[Text]

The ASDF is expected to reach a decision soon on introduction of the Boeing Vertol CH-47 Chinook as its new transport helicopter, to keep pace with Ground Self-Defense Force (GSDF), which plans to purchase the first two CH-47s in FY 1983 for pilot training.

The melding of ASDF and GSDF transport helicopters into the CH-47 model will enable Japan to obtain domestic license production of the helicopter.

The ASDF has tentatively decided to purchase a total of 10 CH-47s -- two in FY 1983, two in FY 1984, three in FY 1985 and three in FY 1986, according to informed sources. The two aircraft for FY 1983 purchase may be imported directly from the United States. Others may be subject to domestic license production.

The ASDF's new helicopter, larger than the currently-used V-107, will be used to carry equipment to radar sites and other spots without runways. Transportation between air bases with runways will be undertaken by the Lockheed C-130H and the C-1 fixed-wing transports.

CSO: 4120/60

ASDF TO LENGTHEN NIKE-J'S SERVICE LIFE

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 4, 5

[Text]

The Japanese Defense Agency (JDA) has named Nippon Electric Co. (NEC) to serve as prime contractor for lengthening the service life of the Nike-J surface-to-air missile system for the Air Self-Defense Force (ASDF).

Although the Nike-J has been outmoded, the JDA's selection of a replacement is expected to take more time. Furthermore, the United States has notified Japan that it will discontinue supply of Nike-J spare parts in 1985. Thus the JDA has been forced to lengthen the Nike-J's service life with spare parts produced by domestic manufacturers under U.S. license until introduction of the new SAM-X system as the Nike-J replacement.

The ASDF started deployment of the Nike-J system in the early 1960s. It now has six Nike-J units. Missiles have been produced by Mitsubishi Heavy Industries Ltd. under license. Spare parts for target tracking radars, launchers, computers and other ground equipment have been supplied by the United States through its Foreign Military Sales channels.

NEC will produce these ground equipment spare parts together with Hitachi Shonan Denshi and NEC Radio Equipment Engineering, which have so far undertaken overhauling of such parts.

The ASDF has so far spent ¥7,000 to 8,000 million annually on maintenance of the Nike-J system. Even if spare parts are subjected to domestic license production, it intends to hold the maintenance spending down to the current level. It has no plan to improve the performance of the Nike-J under the new maintenance setup.

The JDA had planned to introduce the SAM-X to replace the ASDF Nike-J and the Ground Self-Defense Force's (GSDF) Hawk system in FY 1982. But the introduction may be delayed until FY 1984 due to uncertainties about the United States' production of the Raytheon Patriot SAM system, a promising candidate for Japan's SAM-X. Even if the SAM-X introduction starts in FY 1984, it could take several years to replace all Nike-J systems with the new systems.

The delay in SAM-X introduction does not directly affect the GSDF, which has been going ahead with deployment of the Improved Hawk replacing the Basic Hawk.

CSO: 4120/60

JDA TO SET UP NEW RADAR INSTALLATIONS AT TWO SITES

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 5, 6

[Text]

The JDA is expected to set up NEC's sophisticated FPS-II fixed three-dimensional radar installations at Omaezaki in Shizuoka Prefecture in FY 1982 and at Mishima Island in Yamaguchi Prefecture in FY 1983, which would have a major bearing on the ASDF's operation of a new Base Air Defense Environment (BADGE) system in future.

The ASDF's 24 radar sites, excluding four in Okinawa, have only nine equipped with Mitsubishi Electric Corp.'s FPS-1 or NEC's FPS-II three-dimensional radar units which can promptly process data on the flight paths of intruding aircraft. Other radar sites have search and altitude observation radar units to detect three-dimensional positions of intruding aircraft. But these units cannot effectively track intruding aircraft flying at speeds of Mach 2 or more. The JDA wants to set up sophisticated three-dimensional radar units at the other radar sites, including Omaezaki and Mishima.

The Omaezaki radar site is designed to monitor Soviet aircraft operating in the Pacific, while the Mishima site is for surveillance of the strategic Tsushima Straits.

The construction of a new three-dimensional radar installation at the Mishima site may be related especially to the ASDF's introduction of Grumman's E-2C airborne early warning aircraft.

CSO: 4120/60

ASDF PREPARING FOR E-2C INTRODUCTION

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 6, 7

[Text]

The ASDF plans to complete training of maintenance engineers and crewmen for the Grumman E-2C airborne early warning aircraft in the United States by December 1982, prior to acquisition of the first two E-2Cs in January 1983.

The first four maintenance engineers left for the United States in late October to undergo training at U.S. naval facilities and at Grumman Aerospace, the maker of the E-2C. In mid-November, 20 more engineers will follow. The ASDF intends to send a total of 43 engineers, including these 25, to the United States in the current fiscal ending in March 1982 and another 34 in the next fiscal year.

Six pilots will go to the United States in February 1982 for two-month ground training and subsequent eight-month flight training. In addition, 12 crewmen assigned to warning and control functions will leave in March 1982 for a 37-week training period. These E-2C maintenance engineers and crewmen will return home by December 1982 to prepare for domestic training starting in FY 1983.

The ASDF is scheduled to take delivery of eight E-2Cs by FY 1985. A contract for the first four aircraft was concluded in FY 1979 under the United States' foreign military sales (FMS) system. Two of them will arrive in Japan in January 1983 for service at Misawa ASDF Base in Aomori Prefecture. The other two will be delivered in FY 1983. The FMS contract also covers the Americans' training of ASDF men for the E-2C.

Another FMS contract for the remaining four E-2Cs was signed last August. Two of them will be delivered in FY 1984 and other two in FY 1985.

The first two aircraft will be used for practical tests in FY 1983 at Misawa Base, where a communications buffer system will be completed in FY 1982 to mediate data transmission between E-2Cs and the BADGE air defense system.

They will form an ad hoc warning squadron together with two other aircraft to be delivered in the middle of FY 1983. The ad hoc squadron will conduct operational tests from late FY 1983 to FY 1984. In FY 1985 when the last two planes arrive in Japan, an official warning squadron will be organized with personnel totaling about 350 under the direct control of the Air Defense Command. It will undertake airborne warning for the Northern Air Defense Force. Its specific operation schedule is now under consideration.

The ASDF plans to use the E-2C squadron for other regions as well. It has decided to set up another communication buffer system for the Western Air Defense Force by the end of FY 1983.

CSO: 4120/60

SDF HELICOPTER SURVEY TEAM TO VISIT U.S. IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 7, 8

[Text]

The JDA intends to dispatch a joint mission of the three self-defense services to the United States in FY 1982 for a final survey on large helicopters for purchases starting in FY 1983. Funds for the survey are earmarked in the FY 1982 budget request.

The team will consist of two officials from the Ground Self-Defense Force (GSDF), two from the Maritime Self-Defense Force (MSDF) and one from the Air Self-Defense Force (ASDF), to study respective candidates for new large-size helicopters and to estimate costs for their procurement prior to the FY 1983 budget request.

The GSDF wants the Boeing Vertol CH-47 as a replacement for the KHI V-107A transport helicopter. The FY 1980-84 Medium-Term Defense Program (MTDP) requires the GSDF to purchase two new transport helicopters for crew training. Full-scale replacement of V-107As with the new helicopters is expected to be covered by the FY 1983-87 MTDP which will be prepared by the end of FY 1981.

The ASDF also views the CH-47 as a promising candidate for its new large transport helicopter.

The MSDF is seeking a replacement for the V-107 minesweeping helicopter. A promising candidate is the improved RH-53E, a minesweeping version of the Sikorsky CH-53E, which has been adopted by the U.S. Navy. The FY 1980-84 MTDP envisages the MSDF's purchase of six new helicopters replacing V-107s. The service expects that the FY 1983-87 MTDP would include an additional six such helicopters.

All the three services intend to launch purchase of the new large helicopters in FY 1983.

CSO: 4120/60

MILITARY

ARMS STANDARDIZATION AFFECTING GOVERNMENT'S TANK PLAN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 p 8

[Text]

The United States has asked Japan to use Rheinmetall's 120mm gun for the GSDF's new main battle tank (MBT) now in development to promote the western alliance's standardization of military equipment, according to JDA sources.

The U.S. request has affected the JDA's plan to develop and produce all parts of the new MBT domestically. The JDA, which has named Japan Steel Works Co. to develop a 120mm gun for the Model 88 tank, is pondering whether to accept the U.S. request.

The Americans hope that all new tanks of the western alliance would use the Rheinmetall gun. They have adopted the gun for the MX-1 tank now in development. In line with the U.S. request, the West German gun manufacturer has indicated its readiness to allow Japan to produce its 120mm gun under license.

If the JDA decides to use the Rheinmentall gun, Japan Steel Works could lose a contract for the gun development. It has already succeeded in fabricating a prototype gun for the new MBT.

The possible adoption of the Rheinmetall gun would also force Japan to import, or produce under license, cannon-launched guided projectiles (CLGP) for the gun.

The JDA plans to develop the new Model 88 MBT by FY 1988 as the successor to the Model 74 tank.

CSO: 4120/60

ECONOMIC

CURRENT TRENDS OF FOREIGN INVESTMENT INTO COUNTRY ANALYZED

Tokyo DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY in English No 163, 1981 pp 21-25

[Text]

Recent Investments in Securities

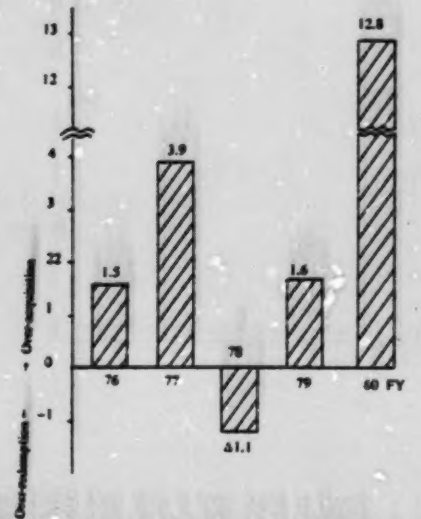
"They're buying Japan itself," is a typical comment to be heard among Japan's financial institutions and securities companies, reflecting the astonishing pace of foreign investment in Japan from last year. Some have even been comparing Japanese shares to *ukiyoe*, a traditional Japanese art genre that has long been popular in the West, equating the two.

Ministry of Finance statistics for FY 1980 (April 1980 – March 1981) arranged on a settlement basis show a net (acquisitions minus disposals) total of $6.144 billion of Japanese stocks acquired by foreign capital, while the total for the bonds market was $6.698 billion. Both figures are all-time high; in fact, in the case of stocks, the sum is five times more than in the previous record year, FY 1974. The net total of some $12.842 billion for stocks and bonds market far exceeds figures for the past five years (see the Figure), and is a 7.6-fold increase over the $1.686 billion registered in FY 1979.

Investment in stocks started rising in earnest from around August last year. In the 1st quarter of FY 1980 the inflow of foreign capital (i.e. acquisition net) was only $871 million, but this jumped to $2.569 billion in the 2nd quarter, evidence of the emergence of the boom in Japanese stocks. While investment can be said to have settled down after that, it is only a relative term, as the actual figures maintained high levels — $1.128 billion in the 3rd quarter, and $1.575 billion in the 4th. As for the bonds market, investment by foreigners peaked around June and July, and was concentrated on government bonds. It is worthy of note, however, that unlike the situation with stocks, bond investment stabilized from the beginning of the fiscal year, and maintained high levels throughout.

Investment in Japan does not mean that in-

Trends of Stock Investment into Japan



1) Each Fiscal Year term is from April to March.
2) The total amount in each FY is a net (acquisition minus redemption).

vestment in securities, it also involves the acquisition of stock in Japanese corporations with the aim of participating in management and setting up technical tie-ups, and direct investment in the form of loans. While active investment of this type has been progressively carried out by American companies noting the improved level of Japanese electronics technology, taken as a whole there have been no changes as great as those seen in securities investment. For example, a look at stock and holdings acquired by foreign investors during calendar 1980 shows there were 684 cases of acquisition (down 10.1% from the previous year) totaling only $328 million (down 35.3%). While this sum is not in itself small, the decline in large-scale investments can be read as signifying caution in direct investment.

Technology import agreements concluded during 1980 came to 1,747, about the same as the previous year. Also showing no change was the fact that about half of these technology imports were from America.

Underlying Power of Oil Money

Where did the funds come from for such record investments, especially into securities? The common view, expressed by the Finance Ministry and concurred with by others, is that oil money and European and American pension funds formed the major sources.

The more important of the two was oil money – the surplus funds of the oil-producing states. Financial officials estimate that of FY 1980 inflow of foreign funds into the stock and bond markets, oil money accounted for some 50 per cent and 70 – 80 per cent respectively. Oil money used to be invested mainly in Britain and the U.S., but in recent years there has been increased recycling to other major nations. Also, while the main form of investment of such funds used to be bank deposits, short-term government securities and other such short-term assets in 1974 (over 60 per cent was in short-term assets), there has been a gradual shift to long-term investment, such as long-term government securities, and private securities. The recent investment activities in Japan by the oil-producing nations show these changes.

"What caused the rapid increase in investment in Japan was the greater quantity of oil money resulting from higher oil prices, plus changes in the stance of the Japanese government toward foreign capital, and the advance of internationalization. Japan has a huge, established economic infrastructure . . . The Japanese financial market is essential to us." These are the words of Saudi Arabia's Al Quraishi, Chairman of the Board of Directors of the Saudi Arabian Monetary Agency (SAMA). What is most surprising though considering how fussy SAMA has been about maintenance of secrecy pertaining to details of its fund investments, is their remark that they are "placing the emphasis on investment in stocks and bonds," showing they have started to talk openly about the nation's oil money investment strategy.

In fact, in spring this year SAMA reached agreement with two of Britain's leading merchant banks, in line with which about $1 billion of assets in the form of Japanese stocks and shares were to be deposited there for investment purposes. With the proportion of surplus funds being invested in the form of yen assets expected to increase, there is no lack of factors for increased investment activities by foreigners. And not only Saudi Arabia; in other oil-producing nations, too, Japanese investment fever has reached new heights. Another feature was the stepped-up investment in Japan by U.S. and European pension funds, from the start of the year. Pension funds are said to total $600 billion in America and £35 billion in U.K., and with the easing of governmental restrictions in the countries concerned, overseas investment is proceeding steadily. Japan is now a recipient of this wave of money: excluding oil money, in the case of stocks the usual view is that most of the inflow of foreign money has come from pension funds.

Assessment of Japanese Economy

When looking at the background to the high rate of investment in Japan, assessment of the fundamentals of the economy is of course highly important. Foreign capital is very sensitive to economic trends and moves, and it goes without saying that the very fact that Japan was selected as a safe and profitable harbor for investment shows how highly rated is the power of Japanese economy. According to a recent OECD (Organization for Economic Cooperation and Development) report on the economic prospects of OECD member nations, Japan will have a real economic growth of 3.5 per cent in 1981 and 4 per cent in 1982, while in the case of West Germany the rate would be minus 1.5 per cent, 2 per cent and for the U.S. 2.5 per cent, 1 per cent respectively; so Japan again comes out top among other leading nations. Judging from the tone of the OECD report, that recovery is lagging and the pace of expansion is slow, the steady recovery in the Japanese economy makes Japan "a unique pump-primer" with regard to the oil-producing countries' oil money and the pension funds of leading nations.

The rapid increase in issues of foreign bonds by the corporations of Japan also testifies to the high level of confidence Japan enjoys from other countries. In FY 1980 there were 114 such bond issues, totaling a record $3.654 billion. Recently Canon, leading manufacturer of cameras, placed a private $50 million issue of convertible debentures; in fact such issues, in the U.S. are becoming very popular, as companies here take advantage of the booming investment in Japan. This contrasts well with the $1.4 billion or so of bonds floated on the Japanese market by foreign enterprises. In fact some specialists are even cautioning lest capital procurement develop into trade friction.

Future Prospects and Problems Japan Will Face

On the surface foreign investment in Japan is proceeding well, but from the start of the new financial year beginning this April, there has been some change in what had previously been a general buying attitude. The effect of high American interest rates and the drop in the yen has been to slow the pace of foreign investment in Japanese bonds. So, in May, for the first time in 14 months, redemptions exceeded acquisitions, to the tune of $384 million.

On this point Takashi Kato, Director-General of the Finance Ministry's international

Finance Bureau, commented that the reason was not a move away by oil money etc.; it was, instead, just that there was a decrease in the inflow of capital. He went on to say that although the effect of the high American interest rates was being felt, he didn't feel a negative flow balance would develop.

Foreign investment in shares maintained a good level in June. Officials feel that as long as the Japanese economy remains fundamentally sound, even though there may be some temporary ups and downs, foreign investors will not direct their attention elsewhere.

The view is that, taking FY 1981 as a whole, active investment in Japan will continue, fueled by funds from the oil-producing nations. While there is a measure of concern over how long the high interest rates will continue in America, such negative factors will not be enough as to cause any major change in the basic inflow of foreign investment. The news of the return of oil money to the West German stock market is a good omen for this, because taken together with the improvement in West Germany's current account balance, it gives rise to the assessment that oil money will not be diverted elsewhere provided the economy is sound. While at present much of the oil money continues to be put into high-interest, short-term dollar investments, the moves in West Germany may indicate future course of the oil-producing countries of the Middle East.

In addition to a policy of recycling oil money through the IMF (International Monetary Fund) and other international organizations, Japan, meaning both the government and private sectors, must not neglect efforts to make Tokyo one of international financial markets in name and fact.

Investment in Japanese securities was greatly eased by the Foreign Exchange Law revision of last December, and continuing on from this, it is hoped that the expansion of yen-based transactions by Japanese banks will form a conduit for the flow of oil money. ■

CSO: 4120/62

CONFLICT BETWEEN POSTAL SAVINGS, BANKS CONTINUES

Tokyo JIHYO in Japanese Oct 81 pp 60-65

[Text] In Kasumigaseki this summer the hottest topic was the conflict between postal savings and the banks. The conflict escalated when the Finance Ministry entered on the side of the banks. The Ministry of Posts and Telecommunications is using public opinion to help it through the crisis.

Historical Turning Point

It has been years since the Ministry of Posts and Telecommunications has had a summer as busy as this year. Vice Minister Asao and the bureau, division and department heads skipped their summer vacations and called on the staff of the LDP Policy Affairs Research Council and opposition party leaders, held briefings for media representatives, and spent days on end in the ministry holding conferences and buried in work. Minister Yamanouchi invariably attended ministry conferences to urge them on.

Minister Yamanouchi gives orders with his face flushed: "These issues are not only vital to the Ministry of Posts, they are serious matters with grave effects on how the people live. Now is the time for the ministry to rouse itself and make every effort."

These are not just words--these really are grave issues for the Ministry of Posts and Telecommunications. When they meet former classmates in other ministries, the division chiefs hear things like, "your eyes are all bloodshot," or "you're so stirred up." It's not likely the whole ministry will be so excited again. The division chiefs realize they have come to a turning point in history.

There are two grave matters. One is that the well-known conflict between postal savings and the banks is nearing a showdown. The other is that telecommunications policies have begun to change--such issues as the opening up of data communications circuits and the revision of the broadcasting law. In both cases the direct users are the Japanese people. To the extent that the Ministry of Posts and Telecommunications is directly involved in upgrading the lives of the people, these policy changes directly affect the Japanese masses. The wording of Minister Yamanouchi's instructions is not the least bit exaggerated.

Advent of Protectors of the Elite

There was a noteworthy Diet interpellation on 20 August. This was the response of the "Discussion Group on Government Involvement in the Field of Finance," an organization with a lengthy title which advises the prime minister.

The conclusion was known from the beginning. When it was organized this January, media representatives and even some government officials said the "selection of personnel was hardly impartial." In addition to Chairman Hiromi Arisawa, there were Jiro Enjoji, Saburo Okita, Kiyoshi Tsuchiya and Ichiro Yoshikuni. Certainly these are all men of eminent scholarship and experience, but they are all macroeconomic specialists. They are well versed in monetary and fiscal matters, and they therefore lean toward the Ministry of Finance. This means they lean toward the banks, and ultimately, away from postal savings.

On seeing this lineup, the division chiefs of the Ministry of Posts and Telecommunications muttered that this was "a prime example of the 'wise men' system." One division chief said: "The guardian angels of the elite have come to subdue an insurrection of the masses."

The postal savings plan commenced in 1875. It was aimed at the common people who were not involved with private financial institutions, and has continued as a depository for small, hard-earned savings. It could be called a matter of gleaning. The private financial institutions put cost ahead of all else. That is natural, since they are profit-making enterprises. They do not have branches in remote locations, and they do not deal with small deposits because of the relatively high cost. They inevitably concentrate on business finances.

Since the Meiji period (late 19th century) the national policy has been promotion of thrift for national prosperity and military strength. After World War II this became a policy of high growth with emphasis on heavy industry and chemicals. At all times, the private financial institutions have been the main source of financial support for the development of enterprises. As the economy grew, the private financial institutions expanded and became the financial mainstream. Government financial policy has been in the hands of the Ministry of Finance and the Bank of Japan, which have given guidance to the private financial institutions with ties to them.

In the meantime, postal savings have meandered along as a side stream. They have not had much impact on business, but they are more directly tied to the life of the masses than the private financial institutions. It is to the post office that the people, wiping away the sweat as they walk in the hot summer sun and saying "hello, how are you" to their neighbors, take their meager savings.

Behind the Scenes of the Postal Savings Discussion Group

In 1980 there was a sudden increase in postal savings which was greeted with screams from the private financial institutions and their backer, the Ministry of Finance. As seen by this elite group, this was an uprising in which the base of the elite was threatened by the very unelite postal savings. In that year, postal savings deposits grew to 60 trillion yen, some 30 percent of all personal savings.

The Ministry of Finance is nothing if not political. Leading executives of the LDP are almost all former finance ministers or their sympathizers. The ministry has extraordinary influence with mass media circles which mold public opinion. News sources for the newspaper financial reporters are limited to the Bank of Japan and the Ministry of Finance, and by extension the private financial institutions. They are close indeed.

The Ministry of Posts and Telecommunications, on the other hand, is not elite as far as financial policy is concerned; it is only a side stream; the media people who deal with postal matters are not well-versed in finance. Its power relationship with the political world and with public opinion is obvious. But it does have an ally in the common people. The close bond which has been built up between the post office and the people over the past century cannot be broken, even by the strength of the Finance Ministry group.

Thus the Ministry of Finance mobilized its sympathizers and "old boys" within the LDP and had Prime Minister Suzuki establish the postal savings discussion group. That is what was meant by the Ministry of Posts division chief's mention of the elite subduing the insurrection of the masses. There is certainly some truth in that. Looking at the origin of the postal savings discussion study group, it was clear from the outset that its report would be slanted toward the private financial institution-Ministry of Finance combination. The postal savings system exists only because it is supported by the Japanese masses; judged by the theories of financial policy it is strictly anti-mainstream. Scholars are generally on the side of compatibility with theory rather than reality.

The report of the discussion group was as expected. It took the position that interest rates must be unified and that the law should be changed to accomplish that. It also said the role of government should complement that of private enterprise; it is clearly a movement in the direction of reviewing fixed deposits and the autonomous operation of postal savings.

Growing Sense of Crisis in the Ministry of Posts

On the same day, the Ministry of Posts and Telecommunications published its views and the minister remarked on the content of the discussion group report. Minister Yamanouchi said: "It ignores the position of the savers--the people of Japan--and is completely unacceptable." This was a hardline stance on disregarding the report. Yamanouchi took the angry position that if the prime minister asked the cabinet to accept the report as received, he would resign immediately.

The Ministry of Posts and Telecommunications, on the basis primarily of the views of Postal Savings Bureau Director General Koichiro Kamo, took the report to task forcefully: "The increase in postal savings is a choice made by the people, and to artificially restrict it would run counter to the needs of the people. Therefore, to restrict the share held by postal savings by degrading fixed deposits, freezing the ceiling and reviewing the collection allowance would be a reversal of the proper order."

"Enhancement of personal finances is called for, whether through government or private institutions, and restriction of improvements in service cannot be tolerated in the least."

"Degrading the commercial content of fixed deposits is mentioned, but that would go against the interest of the savers, and cannot be agreed to."

"It emphasizes the position of financial policy and ignores the position of the people; this is deplorable."

This is the first time a government administrative agency has made such an attack on the report of an advisory body of the prime minister. It indicates the intensity of the sense of crisis in the Ministry of Posts and Telecommunications. But one should not overlook the ministry's pride in being in the right and having the support of the people.

In June the ministry carried out a national survey of 5,000 scholars and media representatives. The result showed that 64 percent opposed unification of interest rates. Because individual savings and corporate savings differ in nature, there should be no objection to the present dual interest system. With regard to fixed deposits, 87 percent said "the private financial institutions should make greater efforts." On the relationship between government and private enterprise, about 70 percent said "financial services for individuals should be improved, whether by government or by private institutions."

Entangled in a Long Struggle

It is the trend of public opinion which is of greatest concern to Director General Kamo and other officials of the Ministry of Posts and Telecommunications. The Suzuki cabinet can, from the nature of the prime minister, be called a "public opinion" cabinet. It has unprecedented sensitivity to public opinion. In an earlier incident, the Foreign Ministry was scolded in connection with the communique on the Japanese-U.S. summit talks, and Foreign Minister Ito resigned; that was a reaction to severe criticism of the communique in newspaper editorials.

The morning after the report was released to the newspapers, executives of the Ministry of Posts and Telecommunications all pored over the editorials in the various newspapers. Some papers supported the report, but that was not the case with influential papers like MAINICHI and ASAHI. They found fault, using such phrases as "unification of interest rates is inappropriate from the perspective of social justice," "at a time of growing distrust for private financial institutions, the people will not be persuaded to have fixed deposits reconsidered or to stop expansion of financing to individuals," and "they say wealth will grow as postal savings increase, but the problem is that the special corporations remain as always." This does not mean that they endorsed everything the Ministry of Posts and Telecommunications said, but they did say there are clearly many problems with the discussion group's report.

Director General Kamo and the others appeared relieved. But victory is not won yet. What will the LDP do? How will the opposition parties respond? Of the opposition parties, the New Liberal Club and the DSP support the report; the JSP, Komeito and JCP oppose it; the all-important LDP is divided. The Finance Ministry "old boys" and sympathizers have a strong voice within the LDP. They hold most of the key party posts and also control the Policy Affairs Research Council. But Ministry of Posts sympathizers must rely on numbers.

For the last year, Chairman Moribe and the LDP Telecommunications Section have been studying the financial system with an intensity even financial scholars find impressive. From time to time they have held discussions with media and academic representatives, who have expressed surprise that these "Diet members have been studying so hard lately." In addition to studying, they have collected sympathizers in the party. More than 300 LDP Diet members have already stated their support for the views of the Telecommunications Section. Vice Minister Asao and Director General Kamo have taken the lead in attending these meetings, and the division chiefs have, needless to say, put great effort into preparation of background materials.

The post offices across the country have gotten "votes" instead of getting money for political contributions. Back when former Prime Minister Kakuei Tanaka came on the scene as a young minister of posts and telecommunications, he wrote these on colored paper in his practiced hand, and distributed them to designated post offices across the country. As minister of posts and telecommunications, Tanaka's relationship with postal authorities was unsteady, but now he is very close to the minister. He is making every effort to recruit sympathizers within the party.

"It will be a long struggle," says Director General Kamo. The Postal Ministry has delayed its personnel shifts as it prepares for this emergency. Director General Kamo and his staff in the Postal Savings Bureau have kept up their efforts through the rotation period. But in any case, they have been drawn into a protracted war with the Ministry of Finance and the private financial institutions. It appears that Prime Minister Suzuki is also playing for time. Wars of endurance are a specialty of the Finance Ministry, which is gradually gaining sympathizers and turning public opinion its way. This will test the tenacity of the Ministry of Posts and Telecommunications.

9601
CSO: 4105/9

FY-80 SCIENCE, TECHNOLOGY WHITE PAPER SUMMARIZED

Tokyo KAGUKU SHIMBUN in Japanese 7 Aug 81 p 1

[Text] Japan Grows to a "10 Percent Country" in Both Research Spending and Number of Researchers; 1980 Science and Technology White Paper

The Science and Technology Agency recently published the FY-80 science and technology white paper entitled "International Comparisons and Future Issues." The main part of the white paper is the international comparisons, showing the world level attained by Japanese science and technology and how much we have progressed in the 35 years since World War II. At the same time it points out the weaknesses of Japanese science and technology and provides recommendations on what must be done to maintain this progress in the future. Recent white papers have been criticized for being overly complicated, so an effort has been made to make this one easier to understand by including plenty of charts and graphs. The agency praises itself on this account, stating: "We were able to write this white paper so that a junior high school student could understand it, without sacrificing the content."

GNP Also One-Tenth of World's

The white paper is made up of three parts: "Among the Countries of the World," "Trends in Science and Technology Activities," and "Government Policy in FY-80."

The first part compares and analyzes the power, potential, and special features of the present science and technology of the major advanced nations. It attempts to establish the position held by Japan and other countries in the world and introduces the policies and strategies to be used by the major advanced countries to promote science and technology in the future.

Japanese economic strength has increased dramatically since the war, and in terms of GNP, we now have one-tenth of the world total. But what about science and technology? The report takes research spending and the number of people involved in research as indicators of the investment in research and the exports of technology-intensive products as an indicator of scientific and technical performance. By these measures, it shows the comparative positions of six major advanced countries (Japan, the United States, Great Britain, France, West Germany, and the Soviet Union) in science and technology.

Throughout the 1970's, these six major advanced countries were responsible for 80 percent of the world total in research spending. This is much greater than the percentage of the world's GNP held by these countries. By this we see that the amount of spending by these six countries for science and technology is very large. Among these countries, Japan ranks third in research spending, with a little less than 10 percent of the world total.

These six countries have more than 70 percent of the world's research personnel. Since the six countries have only 20 percent of the world's population, we can see that people engaged in research are extraordinarly concentrated in these countries. Japan ranks third in this area as well, with over 10 percent of the world total.

It is only natural for a country which can apply the progress of science and technology to its manufacturing capability to become more competitive in exports of technology-intensive products such as chemical products and machinery and to increase its volume of exports. Not surprisingly, the six major advanced nations account for 60 percent of the world total in exports of technology-intensive products. The percentage of technology-intensive products in total exports is particularly great for West Germany and the United States. Japan does not have 10 percent of all exports in the world, but its share of technology-intensive exports alone is greater than 10 percent.

Therefore, in both investment and performance, Japan has passed the 10-percent mark in world science and technology. It has become a "10-percent nation" in terms of science and technology.

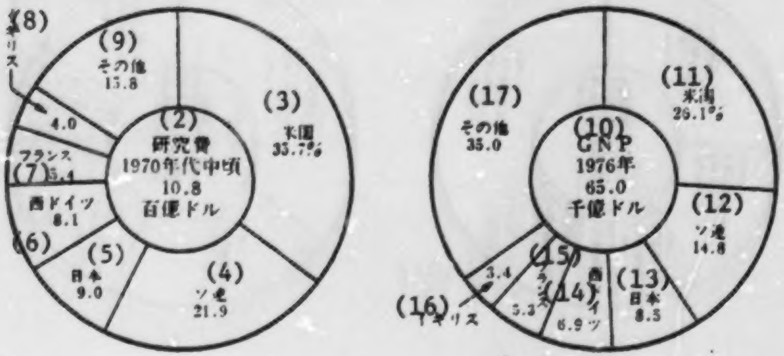
What is Japan's position among the advanced countries? The level of our science and technology is said to be on a par with that of the advanced countries of Europe and America. However, just as before, Japan is behind in fields of advanced science and technology which lead the world, and it lacks in capability for autonomous development.

The United States Is Tops in Technology Development Capability

Eight indicators of a country's technical and economic strength are used to compare the overall strength of Japanese science and technology with that of the major advanced countries. These are: 1) number of registered patents; 2) technology trade balance; 3) exports of technology-intensive products; 4) total added value of manufactured products; 5) research spending; 6) number of researchers; 7) number of patents registered in foreign countries; and 8) technology exports. These eight indexes were shown in graph form for five countries--Japan, the United States, West Germany, France, and Great Britain--with the total of the indexes for the five countries set at 100 so the features of each country's technology can be read in terms of size. According to this comparison, there is a great difference between the United States and the other four countries. In only one area--exports of technology-intensive products--is West Germany ahead of the United States.

However, it is clear that Japan, West Germany, and France are steadily gaining strength, and among these countries, the growth of Japan is particularly dramatic.

(1) 研究費とGNP（1970年代中ごろ）

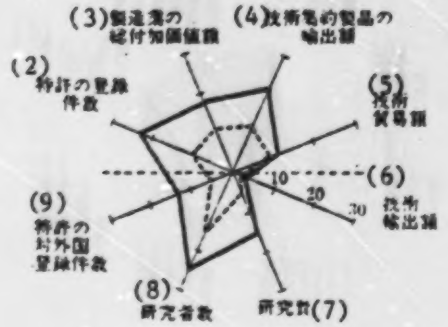


(Key)

(1)	Reserach Spending and GNP (throughout the 1970's)	
(2)	Research spending throughout 1970's: 108 billion dollars	
(3)	United States	35.7 percent
(4)	Soviet Union	21.9 percent
(5)	Japan	9.0 percent
(6)	West Germany	8.1 percent
(7)	France	5.4 percent
(8)	Great Britain	4.0 percent
(9)	Other countries	15.8 percent
(10)	GNP in 1976:	6.5 trillion dollars
(11)	United States	26.1 percent
(12)	Soviet Union	14.8 percent
(13)	Japan	8.5 percent
(14)	West Germany	6.9 percent
(15)	France	5.3 percent
(16)	Great Britain	3.4 percent
(17)	Other countries	35.0 percent

(1) わが国の科学技術総合力

(日 本)



(Key)
(1) Overall Strength of Japanese Science and Technology
(2) Number of registered patents
(3) Total amount of added value in manufacturing industry
(4) Exports of technology-intensive products
(5) Amount of technology trade
(6) Technology exports
(7) Research spending
(8) Number of researchers
(9) Number of patents registered in foreign countries

It appears that the United States is dropping back relative to the advance of Japan, West Germany, and France. Britain is either standing still or losing ground.

Development Funds Still Come Mainly From the Private Sector

The upper half of the graph shows the amount of technological strength and the lower half shows the amount of development capability. Japan has a large head and a small tail here. America is strong in the lower half, and this strength in the lower body gives it stability. Although Japan and West Germany are catching up with the United States in technological strength, we are still far behind in technological development capability.

The next item is the investment of funds and manpower, the motive force for progress in science and technology. In 1977, Japan was third in the world, behind the United States and the Soviet Union, in research spending. However, the ratio of national income was low when compared with Great Britain and West Germany. Also, the percentage of research expenditures borne by the government is low in comparison with the major advanced countries. Funding for research and development centers on the private sector.

In number of researchers, Japan is on about the same level per capita as the United States and much greater than the European countries. With respect to the field of specialty of scientific researchers, the percentage of people in the natural sciences, and particularly in engineering, is very great, providing support for our industrial science and technology.

In results of science and technology, as seen in exports of technology-intensive products, Japan ranks third, after the United States and West Germany. Japan is top in the world in electrical equipment, transportation equipment, and precision equipment. However, in technology trade, Japan and West Germany show a deficit, while the United States and France have a surplus. In terms of new contracts, Japan has been in the black since 1972.

Thus, Japan has developed the strength in science and technology to catch up with or surpass other advanced nations, and its influence in the world has grown to that extent. Certainly, Japan has a great technological capability, but it is still weak in development capability, especially in world-leading advanced technology. This is not the first time this has been pointed out. It has been repeated for the last 10 years. What we do to improve in this area will be the key to our future role as an advanced nation.

9651
CSO: 4106/4

FY-82 BUDGET ESTIMATE FOR SCIENCE, TECHNOLOGY GIVEN

Tokyo KAGAKU SHIMBUN in Japanese 11 Sep 81 p 1

[Text] FY-82 Science and Technology Budget; Government Budget, Estimated Requests Decided

The estimated government budget requests for FY-82 were submitted by all ministries and agencies to the Ministry of Finance on 31 August. Since 1982 is the first year of administrative and financial reform, the slogan for the budget is "zero ceiling." New requests are quite small and there are very few which exceed the previous year's budget by more than 10 percent. In science and technology related budgets, the 6.1-percent increase in the Ministry of Education's scientific research expense subsidy and increased requests for research and development expenses for new energy sources such as nuclear fusion stand out. The estimated budget requests for the Ministry of Education, the Science and Technology Agency, and MITI are given below.

Ministry of Education: Scientific Research Expenses Up 6.1 Percent; 5.5 Billion Yen to the Tristan Program

The Ministry of Education is placing importance on expanding scientific research spending, promoting research in nuclear fusion, and improving accelerator science. It has requested a scientific research expense subsidy of 38 billion yen, an increase of 6.1 percent, and set up new special promotion research programs. It is proceeding on schedule with the fiscal year construction plans for plasma laboratories at Tohoku University and Tsukuba University and experimental equipment for Kyoto University and Osaka University. In accelerator science, the High Energy Physics Laboratory's Tristan Program is entering its second year, and a budget of 5.582 billion yen was requested.

An expansion of scientific research expenses was requested because of the technical and social importance of the scientific research expense subsidy. Because of new special promotion research programs (1 billion yen) and other programs, a request was made for 38 billion yen, an increase of 2.2 billion yen (6.1 percent) over the previous year.

This includes the following: 1) 1 billion yen for special promotion research programs (new): selective promotion of research subjects with potential for achieving superior results in research which leads the world--for example, research on optoelectronic IC's and splitting of the cells of microorganisms;

2) 2.834 billion yen (304-million-yen increase) for promotion of joint research (experimental research) with private sector researchers: greater promotion of joint research in universities; 3) 2.98 billion yen (750-million-yen increase) for training of researchers with potential (encouragement research A); 4) 1.056 billion yen (146-million-yen increase) for promotion of overseas technical research and survey activities (overseas technical surveys); 5) 30.13 billion yen (same as last year) for superior research programs (special research, specific research).

The nuclear fusion research budget includes: 1) 1.098 billion yen (487 million yen last year) for experimental equipment with ultra-conductive material for nuclear fusion in the Tohoku University Metals Research Laboratory; 2) 2.162 billion yen (2.075 billion yen last year) for composite mirror experimental equipment for the Tohoku University Plasma Research Center; 3) 1.541 billion yen (1.172 billion yen last year) for nuclear fusion reaction plasma production experimental equipment; 4) 1.1 billion yen for heliotron F equipment for the Kyoto University Heliotron Nuclear Fusion Research Center; and 5) 2.835 billion yen (2.923 billion yen last year) for Gekko VII laser equipment for the Osaka University Laser Nuclear Fusion Research Center.

The new energy and energy conservation research budget includes: 1) 302 million yen (325 million yen last year) for closed-cycle MHD electricity-generating experimental equipment for the general science and engineering department of Tokyo Institute of Technology, and 2) 310 million yen (240 million yen last year) for heavy radiation damage study equipment for the Atomic Energy Joint Research Center of Tokyo University.

The accelerator science budget includes: 1) 997 million yen (2.875 billion yen last year) for radiation light experimental facilities, and 2) 5.582 billion yen (499 million yen last year) for the Tristan Program, both in the High Energy Physics Laboratory.

The space science budget is 504 million yen (1.465 billion yen last year) for a large radio telescope for the Nobeyama Universe Radio Wave Observation Center of Tokyo University's Tokyo Observatory.

The marine science budget includes 933 million yen (781 million yen last year) for construction of the research ship "Ensei Maru" (460 tons) for the Tokyo University Marine Research Laboratory.

The establishment of new academic departments includes a civil engineering section (40 people) in the engineering department of Utsunomiya University, an electronic machinery engineering section (25 people) in the engineering department of Nagoya University, and a construction engineering department (40 people) in the science and engineering department of Saga University.

2.2 Billion Yen for "Creative Science and Technology"; Expansion of Promotion Coordinating Expenses for the Science and Technology Agency

The Science and Technology Agency budget request includes 316.332 billion yen in General Accounts and 68.429 billion yen in the Power Plant Development Maintenance and Development Measures Special Account, for a total of 384.761 billion yen for the entire agency. This is an increase of 4.5 percent over the 368.270 billion yen for the previous year (FY-81).

The most conspicuous features of next year's budget are: 4 billion yen for expanding the Science and Technology Promotion Coordinating Expenses, 2.25 billion yen for promoting creative science and technology by means of a flexible research system, and 5.01 billion yen for promoting and preparing for international science and technology exhibitions. The categories in the Special Accounts estimated budget request are given below.

Promotion of Marine Development: 5.511 billion yen, which includes 1.473 billion yen for research with a deep-sea underwater research vessel, 35 million yen for marine energy research and development, 116 million yen for research and development of sea zone control technology and a new ocean observation system, and 125 million yen for Black Current development and use research.

Promotion of Disaster Science and Technology: 2.44 billion yen, including 1.219 billion yen for earthquake prediction research; 1) 2.373 billion yen for the National Disaster Science and Technology Center including 1.173 billion yen for earthquake prediction, 190.07 million yen for earthquake countermeasures, 120.05 million yen for snow damage countermeasures. [figures as published]

Promotion of Major Joint Research: 25.385 billion yen. 1) 1.172 billion yen for promotion of life science including 606 million yen for construction of gene recombination research facilities; 2) 9.433 billion yen for aeronautic technology research and development at the Aerospace Technology Laboratory including 6.239 billion yen for research and development of the fan jet STOL experimental aircraft; 3) 6.75 billion yen for the Institute of Physical and Chemical Research including 340 million yen for laser scientific and technical research; 4) 5.539 billion yen for materials technology research and development, e.g., ultimate materials; and 5) 381 million yen for joint use measures for resources.

Preparing Foundation for Science and Technology Promotion: 5.155 billion yen. 1) 445 million yen for reinforcing the foundations of research and development, e.g., by preparing basic science and technology plans; and 2) 4.41 billion yen for promoting distribution of science and technology information.

Expansion of Science and Technology Promotion Coordinating Expenses: 4 billion yen. Promotion of Creative Science and Technology Through Flexible Research System: 2.25 billion yen. Promotion and Preparation of International Science and Technology Exhibitions: 5.01 billion yen--1.915 billion yen for carrying out activities related to government exhibits and 3.049 billion yen for assistance to activities of the International Science and Technology Exhibition Association. Promotion of International Cooperation: 11.072 billion yen--10.762 billion yen for promoting cooperation with the advanced countries, 90 million yen for promoting cooperation with the developing countries, and 220 million yen for promoting cooperation with international organizations.

MITI Doubling Budget for "Next-Generation Technology"; Manganese Nodule Mining and High Speed Computer System

The total MITI budget request from General Accounts for FY-82 is 799.371 billion yen. This is an 11-percent increase over last year's budget of 719.338 billion yen.

A conspicuous feature is the request of 4.812 billion yen for next-generation basic industrial technology development, about twice the figure for the previous year. The requests for manganese nodule mining, 883 million yen, and for a scientific and technical high-speed computer system, 815 million yen, are also greatly increased over last year. A general-use Stirling engine program under the Moonlight Plan is a new project for which 40 million yen was requested. Large-scale projects include an automatic sewing project at 50 million yen and promotion of space industries at 66 million yen.

Development of Industrial Policies To Create Vitality and Promotion of Technological Development: 108.857 billion yen. Securing the Foundations for Development of Technologically Advanced Industries: 16.35 billion yen. 1) 8.977 billion yen for promotion of information industries--5.66 billion yen for promoting development of basic technology for next-generation (fourth generation) electronic computers, 509 million yen for research and development of basic technology for electronic computers (fifth generation); 2) 7.307 billion yen for promoting the aircraft industry--1.502 billion yen for developing a commercial cargo aircraft (YXX), 5.402 billion yen for developing a jet engine (XJB) for use in commercial aircraft; 3) 66 million yen for promoting the space industry--30 million yen for research and development of technology for remote detection of resources, 30 million yen to study trends in high-technology-intensive machinery industries.

Promotion of Technological Development: 84.915 billion yen. 1) 4.812 billion yen for promotion of next-generation basic industrial technology development, 6.25 billion yen for new energy technology research and development (Sunshine Plan)--2.129 billion yen for solar energy, 1.506 billion yen for geothermal energy, 752 million yen for coal energy, 396 million yen for hydrogen energy, and 664 million yen for joint research.

2) 3.124 billion yen for research and development in energy conservation technology (Moonlight Plan)--602 million yen for magnetic hydrodynamics (MHD) electricity generation, 900 million yen for a high-efficiency gas turbine, 252 million yen for a new battery charge storage system, 253 million yen for fuel cell electricity generation technology, 40 million yen for a general-use Stirling engine program, 198 million yen for advanced basic energy conservation technology, 720 million yen for assistance in energy conservation technology development.

3) 17.048 billion yen for promotion of large-scale engineering technology development (large-scale projects)--735 million yen for resource recycling and utilization technology systems, 3.784 billion yen for composite production systems using ultra-high performance lasers, 3.254 billion yen for measurement control systems using optoelectronics, 2.541 billion yen for production methods for basic chemicals using nitrogen monoxide, 104 million yen for ocean floor petroleum production systems, 883 million yen for manganese nodule mining systems, 815 million yen for a high-speed computer system with scientific and technical applications, and 50 million yen for an automatic sewing system.

4) Promotion of private sector technology development--2.349 billion yen for major technology research and development.

5) Promotion of international research cooperation--7 million yen for U.S.-Japan scientific and technical cooperation.

Preparation of a System for Stable Supply of Resources: 6.255 billion yen--814 million yen for wide-ranging geological structure surveys, 971 million yen for precision geological structure surveys, 1.402 billion yen for new mineral deposit exploration, 1.475 billion yen for surveys of mineral resources on the ocean floor in deep water and surveys of exploration technology development, 612 million yen for operations of the Promoting Agency for Metallic Minerals Prospecting, 768 million yen for basic surveys of overseas mineral resources, etc.

9651
CSO: 4106/5

CURRENT TRENDS OF TECHNICAL COOPERATION DISCUSSED

Tokyo DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY in English No 163, 1981 pp 5-8

[Article by Kaoru Honjo, Technical Cooperation Div., International Trade Policy Bureau, MITI]

[Text]

Japan's Technical Cooperation Policy

Basic Policy

There has been growing importance of technical cooperation on the so-called soft side assistance for Socio-economic developments in developing countries. Technical cooperation covers (1) "talent training cooperation" by providing assistance to capable personnel who will shoulder future development of the country, (2) energy-related technical assistance to cope with the world energy shortage, and (3) the strong need for technical cooperation toward medium and small enterprises of the developing countries.

From this viewpoint, it is necessary to expand technical cooperation in these three fields by positively utilizing the abundant technical knowledge, experience, management knowhow, etc., accumulated by private Japanese businesses.

At the same time, it is necessary to provide suitable aid which conforms with the actual needs of the recipient country as the development stages of developing countries are diverse. Therefore, it is necessary to accurately grasp the most appropriate form of technical cooperation according to the real needs of each country.

Present Situation

In 1979, Japan provided a total of $241.9 million in technical cooperation to developing countries which was a 9.4 per cent increase over the preceding year (see the Table). The figure represents a remarkable two-fold increase in comparison with the 1976 total of $108.1 million.

However, the level of Japan's technical cooperation amount is still low when compared with the figures of other advanced countries. It is about one-seventh of France and about one-third of West Germany. It is desired that Japan will further expand its technical cooperation program in the future because the GNP ratio is also low.

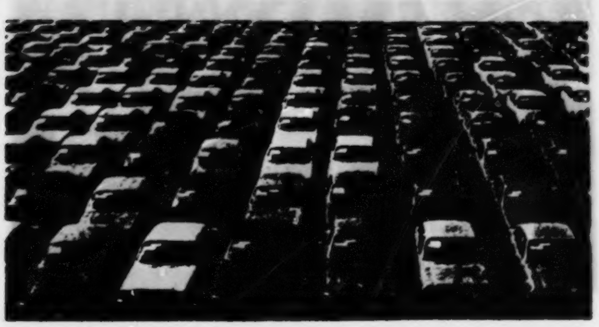
A breakdown of the amount of Japanese technical cooperation shows that trainees and students studying in this country totaled $55.41 million (ratio was 22.9% of the technical cooperation total involving 9,197 persons), dispatch of specialists was $108.56 million (44.9% ratio and 6,673 persons), providing machinery $24.01 million (9.9% ratio) and research cooperation amounted to $8.65 million (3.3% ratio).

By region, Asia received 50 per cent of the technical cooperation followed by Latin America with 18.4 per cent, Africa with 15.7 per cent and the Middle East with 4.1 per cent. The figures show that technical cooperation for Asia is far above those of other regions.

Basic Views on Japan's Technical Cooperation toward Middle East Countries

There are many oil-producing countries in the Middle East including Saudi Arabia, United Arab Emirates, Iraq, Kuwait, etc. It is important that Japan establishes close relations with these countries without limiting relations to the purchase of oil. It is necessary to positively promote economic and technical cooperation toward Middle East countries from this viewpoint.

Since oil-producing countries have abundant development funds, they are seeking promotion of technical cooperation in such fields as establishing economic and social development programs, dispatch of specialists and acceptance of trainees.



Technical Cooperation with Saudi Arabia

Technical Cooperation on Seawater Desalination

An informal request for joint research on desalination of seawater technology was made in November 1975 when Prince Faisal (Chairman of the Board of Directors, SWCC) visited Japan. After several consultations between the two sides, an administrative-level agreement was reached in March of this year.

The technical cooperation agreement calls for joint Japan–Saudi Arabia research to apply Japan's desalination technology by adopting it to domestic conditions in Saudi Arabia and putting the technology into practical use. Another key objective is to train Saudi Arabian personnel to carry out technical transfer in the desalination field to produce fresh water. The securing of fresh water is a very important task for Saudi Arabia and its neighboring countries in order to stabilize the livelihood of the people as well as promote industrial and agricultural development. Therefore, it is very important for Japan to cooperate in this field.

Saudi Arabia is attaching importance to talent training because it is promoting nation-building at present. This technical cooperation program is highly significant because it will lead to strengthening of Saudi Arabia's technical capabilities as well as the development of technicians to operate and manage the desalination plants.

Technical Cooperation on Concentrated Drainage Disposal

In 1979, Saudi Arabia's Ministry of Agriculture and Water asked Japan for cooperation in solving the problem of concentrated drainage disposal caused in the operation of fresh water plants under the reverse infiltration method in the Riyadh area waterworks.

The Japanese side responded by sending a survey team to study handling of the concentrated drainage disposal of the reverse osmosis process fresh water plants established at three water purification plants in Riyadh's Malez, Shemessy and Manfouha districts.

Cooperation for Standardization

Saudi Arabian promotional body for standardization represents the Saudi Arabian Standards Organization (SASO) established in 1972. SASO has been set up to exercise such functions as standards stipulation and quality-guarantee marks, but at present it is not functioning fully.

In recent years, Saudi Arabia desires particular cooperation focusing on the standardization of electric appliances and the perfection of laboratories in compliance with the rapid diffusion of electric products.

In consequence, Japan has so far sent standardization specialists to Saudi Arabia and accepted trainees on several occasions.

Technical Cooperation toward the United Arab Emirates (UAE)

Technical cooperation for seawater desalination by solar energy.

This cooperation was requested by the Minister of Petroleum and Mineral Resources, Otaiba in July 1979 when the then MITI (Ministry of International Trade and Industry) Minister Esaki visited the UAE. It is aimed at carrying out a series of experimental projects on an accelerating basis under severe natural conditions in the Middle East area by establishing test plants. The objective is to put into early use seawater desalination technology through application of solar energy which is suitable to cope with small quantity water demands in isolated islands.

The principal Japanese agency handling the project will be the New Energy Development Organization.

This technical cooperation is an epoch-making project aimed at turning seawater into fresh water by means of solar energy.

In this sense, it will be an important project signifying friendly relationship between Japan and the UAE.

It is, therefore, hoped that the specific project will achieve successful research results at the earliest date and attain original objectives through the expected

Table Japan's Technical Cooperation

Year / Items	1975		1976		1977	
	Amount (US$ million)	Number of persons	Amount (US$ million)	Number of persons	Amount (US$ million)	Number of persons
1. Training program for overseas participants	22.43	6,700	26.61	6,353	35.38	6,862
Students	4.36	821	5.43	856	7.63	921
Trainees	18.07	5,879	21.18	5,497	27.75	5,941
2. Dispatch of specialists and volunteers	39.07	4,211	45.75	4,989	67.34	5,425
Specialists	34.97	3,499	41.06	4,260	61.48	4,637
Overseas cooperation volunteers	4.10	712	4.69	729	5.86	788
3. Providing machinery	7.62	–	12.30	–	14.79	–
4. Research cooperation	3.64	–	2.91	–	4.96	–
5. Others	14.41	–	20.54	–	25.37	–
Technical cooperation (A)	87.17	10,911	108.11	12,082	147.84	12,287
Official development assistance (B)	1,147.7	–	1,104.9	–	1,424,4	–
Ratio to official development assistance (A)/(B)	7.6%	–	9.8%	–	10.4%	–

Year / Items	1978		1979	
	Amount (US$ million)	Number of persons	Amount (US$ million)	Number of persons
1. Training program for overseas participants	51.52	7,726	55.41	9,197
Students	11.15	985	12.41	1,270
Trainees	40.37	6,741	43.00	7,927
2. Dispatch of specialists and volunteers	98.57	6,610	108.56	6,673
Specialists	90.13	5,765	98.82	5,759
Overseas cooperation volunteers	8.44	845	9.74	914
3. Providing machinery	28.75	–	24.01	–
4. Research cooperation	7.82	–	8.65	–
5. Others	34.51	–	45.25	–
Technical cooperation (A)	221.17	14,336	241.88	15,870
Official development assistance (B)	2,215.4	–	2,637.5	–
Ratio to official development assistance (A)/(B)	10.0%	–	9.2%	–

development of related techniques as a result of mutual cooperation.

Acceptance of Trainees and Dispatch of Specialists

As of the end of 1980, Japan has dispatched 24 specialists from such fields as fishery, agriculture, TV broadcasting, etc. while accepting 31 trainees from the UAE who are specilizing in TV broadcasting, electrical communication and civil engineering.

Desert Tree-planting Project

This project is aimed at afforestation of deserts to prevent salt damage (desalting) and to supply water for greening. It is a private technical cooperation project with the assistance of MITI.

The project was concluded in the 1980 fiscal year. The experimental farms are presently operated by the UAE Government.

Technical Cooperation toward Egypt's El Dikheila Steel Plant Program

In order to improve housing shortages caused by a rapid population increase by one million persons per year in Egypt, housing construction is considered as one of the most urgent tasks in the country.

Due to the fact that bar steel and other construction items are lacking which have led to increasing imports, the plan calls for the establishment of a steel plant to replace imports. The program also required the construction of an integrated steel plant under a direct reduction system in Dikheila district, west of Alexandria. It will produce bar steel and wire rod by utilizing domestic natural gas.

In January 1979, the Egyptian Government requested Japan to implement a feasibility study on this project. In response to the request, the Japanese Government carried out a feasibility study as part of its technical cooperation toward Egypt and submitted an F/S report based on the study in August of the same year.

Technical Cooperation toward Other Middle East Countries

Japan has been exercising technical cooperation toward the Middle East nations through development survey, project method techniques, acceptance of trainees and dispatch of specialists.

It is imperative for this country to positively promote similar technical cooperation in the future by taking heed of various needs of the Middle East nations. ■

CSO: 4120/62

SCIENCE AND TECHNOLOGY

JICA'S TECHNICAL COOPERATION REVIEWED

Tokyo DIGEST OF JAPANESE INDUSTRY, TECHNOLOGY in English No 163, 1981 pp 9-13

[Article by Kiyoshi Isaka, Planning Dept., Regional Study and Coordination Div., Japan International Cooperation Agency (JICA)]

[Text]

Japan's ODA Performances and Technical Cooperation toward Middle East

Japan's Official Development Assistance (ODA) amounted to $3.3 billion in 1980. The figure represented a 25.3 per cent increase in comparison with the preceding year's total of $2.64 billion. The 1980 total realized the ODA goal of doubling government aid in three years.

Last year's ODA total increased to 0.32 per cent of the GNP which showed an increase from the previous year's 0.26 per cent. In this manner, Japan's ODA showed a major expansion (See Table 1).

A look at the geographical distribution of the $1.96 billion bilateral ODA for 1980 showed that Asia was the largest with 70.5 per cent (35.9 per cent of the amount was distributed among ASEAN). Asia was followed by Africa with 11.4 per cent, the Middle East with 10.4 per cent and Latin America with 6.0 per cent.

Technical cooperation is classified as grants in the above-mentioned ODA. This country's 1980 technical cooperation amount was $277.8 million which was a 14.8 per cent increase over the preceding year's $241.9 million.

Of the technical cooperation total in 1980, the assistance provided by the Japan International Cooperation Agency (JICA) amounted to $197 million or 70.9 per cent of the total. JICA occupied the top position in Japan's technical cooperation field.

JICA's Technical Cooperation toward Middle East

As a government-based agency providing technical cooperation, JICA carries out various programs such as training programs, expert assignment programs, project-type technical cooperation, development survey programs, the Japan Overseas Cooperation Volunteers Program, etc.

From April 1954 to March 1980, JICA's technical cooperation toward the Middle East totaled 22.1 billion yen. The figure represents 10.6 per cent of the total aid share.

A breakdown of the total by programs showed that the training program was the largest with 5.6 billion yen (25.2%) followed by development survey 5.2 billion yen (23.4%), project-type technical cooperation 5.1 billion yen (23.1%) and expert assignment program 4.1 billion yen (18.7%).

Technical cooperation with the Middle East is carried out under the key JICA programs (see Table 2). JICA's main technical cooperation recipients in the Middle East are Egypt, Iran, Turkey and Iraq.

The following results were achieved in JICA's various programs in fiscal 1980:

(1) Training program: Number of trainees accepted 484 (12.4% share)
(2) Expert assignment program: Number of experts sent – 248 (10.2% share) (note 2)
(3) Development survey program: Number of survey personnel sent – 203 (8.1% share)
(4) Project-type technical cooperation: Ten projects (on going projects as of July 1981)
(5) Japan Overseas Cooperation Volunteers Program: Number of Volunteers dispatched – 111 (10% share) (note 3).

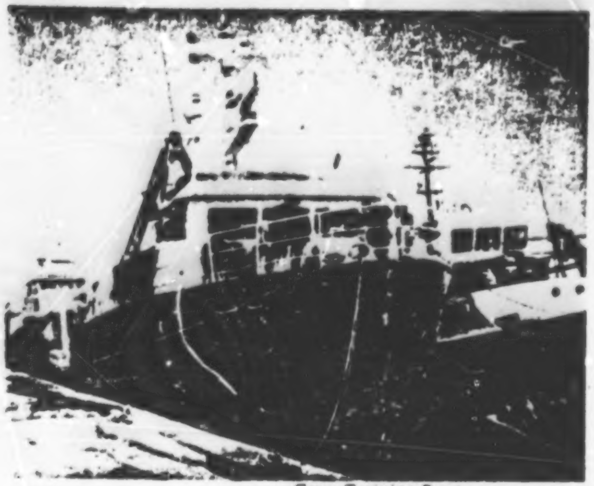
A study of the substance of the above-mentioned JICA performances indicates that most of the trainees were accepted in the field of heavy industry, telecommunications, development planning and agriculture-forestry-fishery.

In the second expert assignment program, the majority of experts were sent to the construction-engineering field, agriculture-forestry-fishery and the medical-welfare field.

Surveys of 18 projects were conducted in the development survey program. They covered following areas;

Transportation and telecommunications sector
EGYPT
Expansion project of Suez Canal (second stage) and telephone network improvement project in Alexandria
Construction sector
JORDAN
Ring road construction plan in Irbid, Jordan
Agriculture sector
EGYPT
South Hosainia Valley agricultural development project

OMAN
Agricultural development project for Batinah area
Fishery sector
SUDAN
Improvement project of fish supply marketing system
UNITED ARAB EMIRATES
Mariculture center construction project
Public Sector
UNITED ARAB EMIRATES
Water resources development project



Crew Training Boat,
Tunisia National Fisheries Center.

Technical cooperation also covers the manufacturing and mining department and other fields.

The fourth project-type technical cooperation program involves the carrying out of long-term technical cooperation. The following projects are being implemented at present.

Future Trend of Technical Cooperation toward the Middle East Area

Japan has maintained a close relationship with the Middle East oil-producing countries in terms of the oil-importing business while JICA has been exercising a wide range of technical cooperation not only toward these oil-producing nations but other non oil-producers.

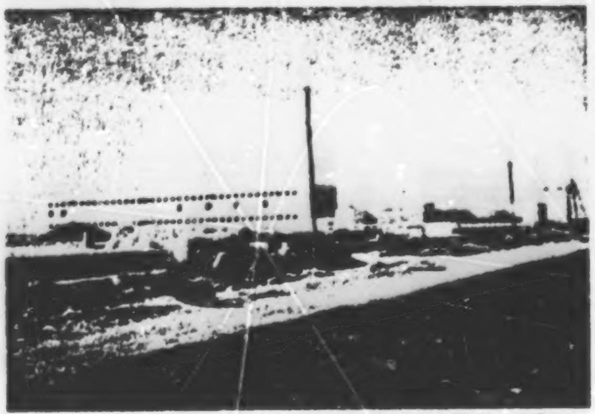
On the other hand, the Middle East countries, whether oil-producing or not, presently need the induction of technology for their economic and social development. Particularly, technical cooperation toward the oil-producing countries is now under study in terms of the implementation of onerous technical cooperation in addition to the hitherto gratuitous type since those nations possessing a great amount of the so-called oil dollars show a high ratio of GNP per head.

In some of the Middle East countries, foreigners are involved in their administrative organizations and government agencies in an effort to carry out technical cooperation.

It appears essential to proceed with technical cooperation by taking into due consideration technical transfer to the counterparts of the said nations in order to assist those countries to educate talent required for nation-building.

In addition, it will become a great task for us to recruit Middle East specialists in Japan in an attempt to meet requirements of cooperation from the Middle East nations because Japan is quite different from them in terms of climate, manners and customs, etc.

Technical cooperation being implemented by JICA has proven to be an instrumental measure to strengthen relationship between Japan and the Middle East countries. It is desired, therefore, that Japanese technical cooperation toward these nations will be expanded and mutual understanding will be deepened. ■



Tunisia National Fisheries Center

Project-Type Technical Cooperation toward Middle East Countries

Country	Project	R&D duration	Outline
Algeria	Medical Center at University of Science and Technology of Oran	April 1978 through March 1983	To improve diagnostic and treatment techniques in such fields as ophthalmology, hematology, oncosis and genetics on the occasion of the establishment of a medical center.
Egypt	Arab Maritime Transport Academy	November 1976 through November 1980 and extended to May 1982	To provide cooperation to the Arab League nations in enhancing maritime transportation with their own ships by training crews who are essential for the development of the maritime transportation industry.
	Shaubra machinery Maintenance Training Center	January 1977 through January 1982	To foster maintenance, administration and repair techniques for machinery and equipment necessary for the reconstruction of the Arab Republic of Egypt.
	Nursing Education and Research	April 1978 through March 1983	To set up educational programs for a short-term nurse leader special training course, to establish a new teaching method adopting audio-visual educational techniques and to bring up nursing leaders on the basis of the Egyptian nurse education program.
	Textile Research and Development	November 1980 through November 1985	To help upgrade production technology of spinning, fabric and knitting, establish and operate a pilot plant and educate mainstay engineers in an effort to enlarge the textile sector of the National Research Inst. and improve its R&D ability.
Iraq	Electric & Electronic Industries Training Center	September 1975 through July 1981	To train experienced technicians to engage in repair service and to engage in maintenance of elevators, air conditioners, cooling equipment and other electronic apparatus.
Jordan	Electronics Service Center, Royal Scientific Academy	December 1977 through December 1981	To provide cooperative service in maintaining and testing electronic measurements in the electric communication field in order to contribute to improvement of the electronics engineering application sector.
Saudi Arabia	The Riyadh Electronics Technical High School	June 1974 through school opening	To train high-level engineers for the future electronics industry.
Tunisia	National Fisheries Center	July 1978 through June 1981 and extended to December 1982	To improve technical quality of fisheries and reeducate instructors by establishing the National Fisheries Institute.
	Drug Quality Control	April 1980 through March 1982	To upgrade the quality of medicines through technical cooperation in such fields as the chemical analysis, apparatus analysis and bacteriological testing of medicines.

Table 1. Japan's Economic and Technical Cooperation

Year Item			1979	Composition ratio (%)	1980	Growth rate (%)	Composition ratio (%)
Official development assistance	Bilateral	Grants	560.2	21.2	652.6	16.5	19.8
		Financial grants	318.3	12.0	374.8	17.8	11.4
		Technical assistance	241.9	9.2	277.8	14.8	8.4
		(JICA)	(159.8)	(6.1)	(197.0)	(23.3)	(6.0)
		Loans	1,361.0	51.6	1,308.2	△ 3.9	39.6
		Total	1,921.2	72.8	1,960.8	2.1	59.4
	Capital participations in international organs		716.3	27.2	1,342.9	87.5	40.6
	Grand total		2,637.5	100	3.303.7	25.3	100.0
	Comparison with the previous year (%)		19.1		25.3		
	Ratio to GNP (%)		0.26		0.32		

(Note 1)

Following is a gist of varied programs being exercised by JICA:

Trainees acceptance project

In response to the requests of the developing countries, JICA accepts engineer trainees from those nations for technical education, increasing new knowledge and retraining, thus contributing to the partner countries' economic and social development and to promotion of mutual friendship.

Export assignment program

JICA dispatches a number of specialists and engineers to the developing countries who practice planning, technical education development programs and researches at the government agencies and experimental study organizations in partner countries.

Development survey program

JICA conducts consulting cooperation by dispatching a survey mission in an effort to carry out public development programs for the basic industries which play an important role in the economic growth of the developing countries.

For instance, they include road construction, port-facility construction, communication network establishment and electric power development.

Project type technical cooperation

JICA provides cooperation toward vocational training projects, agricultural development projects and medical cooperation projects in an integrated cooperation method which covers a combination of various forms of cooperation and an overall cooperation system ranging from planning to implementation of technical cooperation programs.

Japan Overseas Cooperation Volunteers program

In response to the cooperation requirements of the developing nations, JICA sends Japanese youth volunteers to those countries in an attempt to contribute to their economic and social development by having the youths live together with the local people in host countries.

(Note 2)

The number of dispatched specialists includes those under the project-type technical cooperation plan.

(Note 3)

Japanese cooperation volunteer corps are dispatched to three countries in the Middle East area such as Morocco, Tunisia and Syria.

Table 2. Technical Cooperation Expenses by Program and Region (1954–1980) (Unit: Billion yen)

Region	Overseas Participants	Experts Dispatch	Development Survey	Technical Cooperation	Japan Overseas Cooperation Volunteers	Others	Total
Asia	19.0	14.8	27.2	39.2	6.9	4.1	111.2
Middle East	5.6	4.1	5.2	5.1	1.5	0.6	22.1
Africa	2.8	5.1	7.1	5.0	6.0	1.0	27.0
Latin America	7.5	7.0	9.5	7.6	1.1	2.0	34.7
Others	1.9	3.5	1.5	0.7	5.8	0.5	13.9
Total	36.8	34.5	50.5	57.6	21.3	8.2	208.9

CSO: 4120/62

SCIENCE AND TECHNOLOGY

GOVERNMENT DECIDES ON BASIC ENERGY ACTIONS

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 39, 28 Sep 81 pp 1-4

[Text]

On September 22, the government held a Ministerial Council Meeting for the Promotion of Overall Energy Policy Measures, at which the nation's basic energy actions were decided, with special emphasis placed on the following:

- The government will buy up 2.4 million kiloliters (15.1 million barrels) of crude oil from private refiners by the end of this year to build up the government-owned oil stockpiles (owned by the governmental Japan National Oil Corp.), taking advantage of the current world oil glut and concurrently relieving refiners of the financial burden arising from lifting crude oil in excess of their refinery processing needs, as obligated under existing crude oil purchase contracts. The government has already purchased up to 1.1 million kiloliters (6.9 million barrels) from refiners since the beginning of fiscal 1981 (April 1, 1981). This means that government-owned oil stockpiles will increase by 3.5 million kiloliters (22.0 million barrels) to approximately 11 million kiloliters (69.2 million barrels) during the current fiscal year. This corresponds to 17.6 days' supply, based on the net daily oil imports of 3,933 thousand barrels for domestic fuel product consumption during calendar 1980. (Related article on page 10.)

- To speed up the expansion of nuclear power plant capacity, steps will be taken to simplify the procedures to obtain government approval of applications for siting new nuclear power plants, thereby shortening the total period required for completion of these plants, currently 15 years, by an average of 2 years.

- The government has designated three additional areas for siting large-scale electric power generating facilities, as follows:

  . Shimokita, Aomori Prefecture, for constructing a 1,100-MW nuclear power plant to be placed onstream in June 1990 by Tohcku Electric Power Co.

- Reihoku, Kumamoto Prefecture, for constructing two units (with a power generating capacity of 700 MW each) of coal-burning thermal power plants to be placed onstream in October 1988 and October 1989, respectively, by Kyushu Electric Power Co.

- Higashi-Niigata, Niigata Prefecture, for constructing a 1,090-MW LNG-burning thermal power plant to be placed onstream in September 1984 by Tohoku Electric Power Co.

Of the foregoing three projects, the start of construction work of thermal power plants at Reihoku and Higashi-Niigata was approved at the Electric Power Development Coordination Council meeting held on June 30 of this year (JPEW, July 13 - p.8), while that of the nuclear power plant at Shimokita is expected to be approved at a Council meeting to be held next year.

Concurrent with the designation of the foregoing three additional areas, two areas where thermal power plants went onstream recently -- a 700-MW oil-burning thermal power plant at Date, Hokkaido, and a 1,400-MW oil-burning thermal power plant at Atsumi, Aichi Prefecture -- have been deleted from the list of designated areas.

After these additions and deletions, there are at present a total of 29 areas designated by the government for electric power plant siting with a combined capacity of 39,067 MW -- 13 areas for nuclear power plants with a combined capacity of 18,172 MW, 7 areas for coal-burning thermal power plants (10,000 MW), 3 areas for LNG-burning thermal power plants (4,490 MW), 5 areas for oil-burning thermal power plants (5,125 MW), and one area for a hydropower plant (1,280 MW).

The government first introduced this system of designating specific areas for siting large-scale electric power generating facilities on June 7, 1977, when the Ministerial Council for the Promotion of Overall Energy Policy Measures held its meeting. MITI is planning to request the Ministry of Finance for the first time to approve a budget appropriation totaling ¥1,500 million ($6.5 million) for fiscal 1982 (beginning April 1, 1982) as government subsidies to be granted to local governments to encourage the cooperation of residents in the designated areas with power plant construction projects.

Listed on pages 3 and 4 as supplements are the 29 areas designated by the government for large-scale electric power plant construction projects, as they were published by MITI on September 22, 1981. (Please note that the list includes power plant projects, construction of which have yet to be approved by the Electric Power Development Coordination Council, and hence it is believed to be of interest to our readers, as it shows a long-range plan for electric power plant capacity expansion on a plant-by-plant basis. - Editor)

GOVERNMENT-DESIGNATED AREAS FOR LARGE-SCALE ELECTRIC POWER PLANT CONSTRUCTION PROJECTS

(As of September 22, 1981)

AREA	ELECTRIC POWER COMPANY	PLANT CAPACITY, MW	CONSTRUCTION STARTED	DATE ONSTREAM	DATE OF DESIGNATION
Nuclear Power Plants (13 Areas)		18,172			
. Kyowa-Tomari, Hokkaido	Hokkaido Electric Power Co.	#1 579 #2 579	September 1983	September 1988 February 1990	January 23, 1978
. Shimokita, Aomori Pref.	Tohoku Electric Power Co.	#1 1,100	July 1984	June 1990	September 22, 1981
. Onagawa, Miyagi Pref.	Tohoku Electric Power Co.	#1 524	December 1979	June 1984	June 7, 1977
. Namie-Odaka, Fukushima Pref.	Tohoku Electric Power Co.	#1 825	January 1985	November 1989	June 7, 1977
. Maki, Niigata Pref.	Tohoku Electric Power Co.	#1 825	August 1984	August 1989	June 15, 1979
. Kashiwazaki-Kariwa, Niigata Pref.	Tokyo Electric Power Co.	#1 1,100 #2 1,100 #5 1,100	December 1978 May 1983	October 1985 April 1989 October 1989	June 7, 1977
. Ashihama, Mie Pref.	Chubu Electric Power Co.	#1 1,100 #2 1,100	(Announcement withheld)		June 7, 1977
. Noto, Ishikawa Pref.	Hokuriku Electric Power Co.	#1 540	September 1985	March 1990	June 7, 1977
. Tsuruga, Fukui Pref.	Japan Atomic Power Co.	#2 1,160	June 1981	March 1986	June 7, 1977
. Takahama, Fukui Pref.	Kansai Electric Power Co.	#3 870 #4 870	December 1980	February 1985 August 1985	January 23, 1978
. Shimane, Shimane Pref.	Chugoku Electric Power Co.	#2 820	June 1983	September 1988	June 7, 1977
. Toyokita, Yamaguchi Pref.	Chugoku Electric Power Co.	#1 1,100 #2 1,100	November 1986	November 1991 November 1993	January 23, 1978
. Sendai, Kagoshima Pref.	Kyushu Electric Power Co.	#1 890 #2 890	January 1979 May 1981	July 1984 March 1986	June 7, 1977
Coal-Burning Thermal Power Plants (7 Areas)		10,000			
. Tomato-Azuma, Hokkaido	Hokkaido Electric Power Co.	#2 600	September 1981	September 1984	October 24, 1980
. Noshiro, Akita Pref.	Tohoku Electric Power Co.	#1 600 #2 600 #3 600	July 1984 December 1987 December 1988	July 1987 December 1990 December 1991	June 15, 1979
. Takehara, Hiroshima Pref.	Electric Power Development Co.	#3 700	May 1980	March 1983	June 7, 1977
. Ryujima, Hiroshima Pref.	Chugoku Electric Power Co.	#1 700	February 1986	January 1989	June 7, 1977
. Misumi, Shimane Pref.	Chugoku Electric Power Co.	#1 700 #2 700	August 1986 May 1987	July 1989 April 1990	October 24, 1980

- Continued on next page -

GOVERNMENT-DESIGNATED AREAS FOR LARGE-SCALE ELECTRIC POWER PLANT CONSTRUCTION PROJECTS (continued)

(As of September 22, 1981)

AREA	ELECTRIC POWER COMPANY	PLANT CAPACITY, MW		CONSTRUCTION STARTED	DATE ONSTREAM	DATE OF DESIGNATION
Coal-Burning Thermal Power Plants (cont'd)						
. Matsuura, Nagasaki Pref.	Kyushu Electric Power Co.	#1 #2	700 700	October 1982 October 1987	October 1985 October 1990	January 23, 1978
	Electric Power Development Co.	#1 #2	1,000 1,000	November 1982 July 1987	July 1986 March 1991	
. Reihoku, Kumamoto Pref.	Kyushu Electric Power Co.	#1 #2	700 700	) October 1985	October 1988 October 1989	September 22, 1981
LNG-Burning Thermal Power Plants (3 Areas)			4,490			
. Higashi-Niigata, Niigata Pref.	Tohoku Electric Power Co.	#3	1,090	December 1981	September 1984	September 22, 1981
. Futtsu, Chiba Pref.	Tokyo Electric Power Co.	#1 #2	1,000 1,000	) September 1982	September 1985 December 1985	January 23, 1978
. Yanai, Yamaguchi Pref.	Chugoku Electric Power Co.	#1 #2	700 700	September 1984 September 1985	April 1987 April 1988	October 24, 1980
Oil-Burning Thermal Power Plants (5 Areas)			5,125			
. Nanao, Ishikawa Pref.	Hokuriku Electric Power Co.	#1	500	January 1983	March 1986	June 7, 1977
. Aioi, Hyogo Pref.	Kansai Electric Power Co.	#1 #2 #3	375 375 375	) November 1979	September 1982 November 1982 December 1982	June 7, 1977
. Gobo, Wakayama Pref.	Kansai Electric Power Co.	#1 #2 #3	600 600 600	) April 1980	June 1984 August 1984 December 1984	January 23, 1978
. Iwakuni, Yamaguchi Pref.	Chugoku Electric Power Co.	#3	500	April 1979	September 1981	January 23, 1978
. (Announcement withheld)			600 600			June 15, 1979
Hydropower Plant (1 Area)			1,280			
Ohkawachi, Hyogo Pref.	Kansai Electric Power Co.		1,280	January 1983	April 1988 June 1988 April 1989 June 1989	January 23, 1978
TOTAL (29 Areas)			39,067			

(Source: Natural Resources & Energy Agency, MITI)

CSO: 4120/61

ELECTRIC UTILITY TO START COM BURNING IN POWER PLANTS

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 38, 21 Sep 81 pp 4-6

[Text]

For the first time for an electric utility to make a total conversion from oil burning to coal-oil mixture (COM) fuel burning, Tokyo Electric Power Co. announced a plan on September 11 for shifting the existing thermal power plants at Yokosuka, Kanagawa Pref., currently burning crude and fuel oil, to those entirely burning COM fuel by 1984.

Tokyo Electric Power is also planning to introduce COM fuel burning at other thermal power plants and other electric utilities are expected to follow suit with similar plans.

With the current emphasis on increasing the industrial consumption of coal, the COM fuel is regarded as a "go-between" from oil to coal in its wider application to thermal power plants, blast furnaces, cement kilns and other industrial combustion facilities.

According to a survey report published on February 26, 1980, by the Resources Research Council, an advisory body to the director-general of the Science and Technology Agency, Japan's current potential demand for COM fuel is estimated to total 17.8 million tons annually as shown below by use. This level of COM fuel demand would consume 8.9 million tons per year of steam coal on a 50:50 coal-oil mixture basis (JPEW, March 10, 1980 - p.10).

	Metric Tons/Year
Thermal power plants	10.5
Blast furnaces	3.4
Cement kilns	0.9
Others	3.0
	17.8

According to the Tokyo Electric Power's plan submitted to the Yokosuka municipal government, the shift in fuel from fuel oil to COM will be made on the existing No.1 and No.2 plants (with a power generating capacity of 265,000 kw each) of the Yokosuka Thermal Power Station, consuming approximately 900,000 metric tons per year of COM fuel (assuming a 70 percent COM utilization rate) and saving 300,000 kiloliters per year (5,170 barrels per day) of oil.

The COM fuel to be consumed at Yokosuka is expected to be produced at a plant to be built at Onahama, Fukushima Pref., by Japan COM Co., which was established on April 1, 1981, jointly by Tokyo Electric Power Co., Electric Power Development Co. (EPDC) and five other companies (JPEW, April 13 - p.12), and will be transported by a coastal barge to Yokosuka.

Preparations for the shift for COM fuel burning will be started next month, with changes made to burners and piping and construction of desulfurization, denitrification, and dust collecting facilities started in October 1982, at an estimated total cost of ¥50 billion ($220 million). Present plans call for starting the COM fuel burning in November 1984 for the No.1 plant and March 1985 for the No.2.

As reported previously (JPEW, March 10, 1980 - p.16), a demonstration test for COM fuel burning as partially applied to a commercial plant has been under way since March of this year at EPDC's Takehara No.1 thermal plant, Hiroshima Pref. (250,000 kw, originally designed for exclusive use of coal). The test operation will be continued for one year using two (out of 20) burners for COM fuel burning, consuming about 10 tons of COM fuel hourly.

In parallel to the demonstration test outlined above, EPDC is planning to convert its Takehara No.2 thermal power plant (350,000 kw, originally designed for exclusive use of crude/fuel oil) to one exclusively burning COM fuel by 1983. Approximately 600,000 metric tons per year of COM fuel required for the Takehara No.2 plant will be produced at a COM manufacturing plant to be built within the Nippon Kokan's steel mill at Fukuyama, Hiroshima Pref.

According to a report on the latest developments in COM fuel R&D in Japan, recently published by the New Energy Development Organization* (NEDO), there will be great economic incentives for converting the existing coal-burning boilers to COM-burning ones for boilers of 200 tons/hour or larger, while a shift from oil-burning to COM-burning is not so economically attractive as that from coal to COM. A small boiler (50 tons/hour) to be newly built for COM fuel burning does not warrant economic advantages over fuel oil burning. For further details, see the table on the next page.

(*) NEDO was established on October 1, 1980, as a joint government-industry organization under the Alternative Energy Development and Utilization Law (Law No.71 of 1980, enforced on September 29, 1980), to implement new energy development projects and overseas coal resources development.

(Continued from page 3)

(Unit: ¥billion) Estimated in July	Aramco Group (6 companies)	Non-Aramco Group (8 companies)	Total (14 companies)
April-June 1981	-40 (-45)	-190 (-55)	-230 (-100)
July-September	-40 (-25)	-200 (-55)	-240 (-80)
April-September	-80 (-70)	-390 (-110)	-470 (-180)
Updated in September			
April-June 1981	-20 (-45)	-210 (-60)	-230 (-105)
July-September	-30 (-45)	-180 (-100)	-210 (-145)
April-September	-50 (-90)	-390 (-160)	-440 (-250)

Economic Viability of COM Fuel in Japan

A = Originally designed for fuel oil burning B = Originally designed for coal burning

	750 tons/hr Boiler*		200 tons/hr Boiler		100 tons/hr Boiler		New Boiler 50 tons/hr COM Burning
	A	B	A	B	A	B	
Capital expenditure for remodelling to COM burning, ¥ mil.	5,000	1,870	1,600	830	430	240	530
Operating cost due to COM burning, excl. fuel cost, ¥ mil. (A)	1,583	993	543	336	126	75	120
(Capital cost**)	(738)	(276)	(236)	(122)	(63)	(35)	(78)
(Direct cost⁺)	(845)	(717)	(307)	(214)	(63)	(40)	(42)
Fuel consumption							
COM, tons/yr	..... 471,640		.....131,750.....		..... 52,210		27,190
Fuel oil, tons/yr	..... 377,030		.....107,220.....		..... 40,300		21,580
Fuel cost⁺⁺, ¥ mil./yr							
COM (a)	..... 20,327		..... 5,678		..... 2,250		1,229
Fuel oil (b)	..... 21,943		..... 6,240		..... 2,345		1,351
Difference (b-a), (B)	..... 1,616		..... 562		..... 95		122
Economic Incentive to COM, (B-A) ¥ mil./yr	33	623	19	226	(31)	20	2

(*) Equivalent to 250 MW.
(**) Interest, depreciation, fixed asset tax, insurance, etc. @14.75% of capital expenditures.
(+) Labor, maintenance, utility, ash disposal (@¥5,000/ton), etc.
(++) Coal price @¥15,000/ton.
Fuel oil price @¥53,000/kl for 3.0% sulfur (for boilers of 100 tons/hr or above) and @¥57,000/kl for 1.0% sulfur (for 50 tons/hr boilers).
COM price @¥43,100/ton for boilers of 100 tons/hr or above and @¥45,200/ton for 50 tons/hr boilers, including COM production cost @¥5,200/ton and transportation over a 200-km distance.

Sulfur content of fuel oil used for boilers of 100 tons/hr or above is assumed to be 3.0% because of flue gas desulfurization facilities attached to boilers, while that for 50 tons/hr boilers without such anti-pollution facilities is assumed to be 1.0%.

CSO: 4120/61

SCIENCE AND TECHNOLOGY

MEASURES TO PROMOTE ELECTRIC POWER PLANT CONSTRUCTION PROJECTS

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 40, 5 Oct 81 pp 1-5

[Text]

In an effort to strengthen policy measures to facilitate construction of electric power generating plants throughout the country, the government instituted three systems of providing grant-in-aid* to local government bodies, two beginning on October 1, and the third beginning toward the end of this year:

- **Grant-in-aid to prefectural governments where nuclear power generating facilities are installed.**
- **Grant-in-aid to prefectural governments in whose prefectures the electric power generation exceeds the electric power consumption.**
- **Grant-in-aid to prefectural governments where aged hydraulic power plants are in operation.**

In order to implement these measures the Ministry of Finance had approved budget appropriations totaling ¥8,865 million ($38.5 million) for expenditure in fiscal 1981 -- the first year of extending the grant-in-aid.

In the background of the institution of the three grant-in-aid systems is the government's determination to step up the electric power generating facilities -- particularly nuclear power generating facilities -- due to the growing apprehension of local residents regarding the safety and environmental impact of such large-scale projects.

Shown below is the latest available government forecast of Japan's electric power generating facilities to be installed by the end of fiscal 1990:

(*) Grant-in-aid ("Kofukin" in Japanese) differs from subsidy ("Hojokin") in that grant-in-aid is extended to a public body or its equivalent, whereas a subsidy is extended to a private body.

	End of Fiscal 1979 (Actual)		End of Fiscal 1990 (Forecast)	
	1,000 kw	% share	1,000 kw	% share
Nuclear power	14,950	12.0	51,000-53,000	22.1-22.9
Thermal power:				
Coal	4,410	3.6	23,000	10.0
LNG	18,630	15.0	43,500	18.8
LPG	600	0.5	6,000	2.6
Oil	58,220	46.9	53,000-51,000	22.9-22.1
	81,860	66.0	125,500-123,500	54.3-53.5
Hydraulic power:				
Conventional	17,690	14.2	24,500	10.6
Pumped-up storage	9,520	7.7	27,000	11.7
	27,210	21.9	51,500	22.3
Geothermal power	130	0.1	3,000	1.3
Total	124,150	100.0	231,000	100.0

As shown in the foregoing table, nuclear power and coal-burning thermal power plant capacities are expected to grow rapidly in the next dacade, while the oil-burning thermal power plant capacities are expected to shrink, primarily due to the decided economic advantages inherent to nuclear and coal vs. oil, as compared below:

	Power Generating Cost* (¥ per kwh)	Scale of Plant** (1,000 kw)
Nuclear	8-9 (approx. 25%)	1,000
Coal	12-13 (approx. 50%)	790
Hydraulic (conventional)	17-18 (-)	20
Oil	17-18 (approx. 80%)	470

Outlined below are the three newly-introduced grant-in-aid systems:

(1) Grant-in-aid [illegible] prefectural governments where nuclear power generating facilities are in operation, under construction, and for which construction is planned to start by the end of fiscal 1985.

Grant-in-aid, as computed in accerdance with the following scale, is extended to the prefectural governments concerned for eventual allocation to

---

(*) Based on a hypothetical model plant which went onstream in fiscal 1980. Percentage figures shown in brackets represent fuel cost as a percentage of total power generating cost.

(**) Based on new plants, for which construction was started in fiscal 1980 or is planned in fiscal 1981.

local residents and private enterprises in and neighboring villages and towns or for the promotion of employment opportunities. In actuality, the grant-in-aid to local residents and enterprises will be in the form of deduction from electricity bills issued by the electric power companies involved.

Rate of grant-in-aid:

Power Generating Capacity (1,000 kw)	Local Residents (¥/household/mo)	Private Enterprises (¥/contr.kw/mo)
Less than 1,000	300	75
1,000-2,000	400	100
2,000-3,000	500	125
3,000-4,000	600	150
4,000-5,000	700	175
5,000-6,000	800	200
6,000 or more	900	225

One-half of the foregoing rates apply to residents and enterprises in neighboring villages and towns where nuclear power generating facilities are located.

Premium rates calculated by the following formula apply to newly-built facilities:

$$\text{Premium rates} = \text{Basic rates} \times \left(1 + 0.5 \times \frac{\text{New capacity}}{\text{Total capacity (incl.new)}}\right)$$

(2) Grant-in-aid to local governments of net electricity-exporting prefectures.

In view of the fact that large-scale electric power generation projects contribute very little toward creating new employment opportunities in the areas in question, grants are intended to encourage local governments to cooperate with electric power plant projects by providing national government aid to develop employment opportunities for local residents in prefectures which satisfy the following two conditions:

- Electric power generation is 1.5 times or more of the total electric power consumed, thereby making the prefecture a net electricity-exporting prefecture.
- The areas designated for siting industrial plants under the Industry Relocation Promotion Law (Law No. 73 of 1972) account for 50 percent or more of the total area of the prefecture in question.

Moreover, nuclear power and coal-burning thermal power generating facilities, including those under construction, that are located in prefectures coming under this grant-in-aid system are designated as "special areas for inviting industrial plants" which can enjoy preferential treatment for receiving increased subsidies under the Industrial Relocation Promotion Law.

Rate of grant-in-aid:

Net Export of Electricity (million kwh)	Grant-in-Aid (¥million)
Less than 5,000	50
5,000-10,000	100
10,000-15,000	200
15,000-20,000	300
20,000 or more	400

(3) Grant-in-aid to prefectural governments for subsequent distribution to towns and villages where aged hydraulic power plants are in operation.

The legal service life of hydraulic power plants is 45 years, compared with 15 years for thermal power plants. After hydraulic power plants are in service for a number of years, property taxes raised from these facilities decline considerably, thereby bringing little economic benefit to the towns or villages involved.

In order to compensate for this disadvantage suffered by towns or villages where hydraulic power plants are located (as opposed to towns or villages where thermal power plants are located), the government has instituted a new grant-in-aid system which goes into effect late October or early November of this year. Under this system, each town or village where a hydraulic power plant has been in operation for 15 years or more, with a combined power generating capacity of 1,000 kw or more and a combined power generation of 5 million kwh or more annually, will be eligible to receive the grant-in-aid for seven years at the rate shown below in order to assist in the installation of facilities designed to alleviate the environmental impact of the hydraulic power plants.

Rate of grant-in-aid:

> ¥0.05 per kwh (¥0.025 per kwh generated by pumped-up storage), with a minimum amount guaranteed at ¥3 million for each town or village and a maximum amount of ¥30 million allowable for each town or village.

Apart from the three grant-in-aid systems going into effect this year, as outlined above, a grant-in-aid system designed to help improve public facilities in areas adjacent to electric power generating facilities has been in effect since fiscal 1974.

Beginning this fiscal year, facilities built by the Power Reactor and Nuclear Fuel Development Corp. to manufacture fuels for fast breeder reactors have been added to the facilities qualified to receive grant-in-aid under this system. Moreover, a fund has been established this year to facilitate maintenance of the public facilities built with grant-in-aid extended in previous years under this system.

Summarized below are the national budget appropriations under the special account for promotion of the electric power plant siting which are marked for expenditure in current fiscal 1981 (compared with those for fiscal 1980). Items marked (*) indicate those newly instituted in the fiscal 1981 budget.

(Unit: ¥million)

	Fiscal 1981	Fiscal 1980
(1) Grant-in-aid to local government cooperative with power plant projects	39,682	41,414
(2) Environmental impact studies of nuclear power plants	14,037	10,424
(3) Subsidies to improve nuclear power plant safety	2,538	4,440
(4)*Grant-in-aid to local governments where nuclear power plants are in operation and under construction/planning	3,027	0
(5)*Grant-in-aid to local governments of net electricity exporting prefectures	2,300	0
(6)*Grant-in-aid to local governments where aged hydraulic power plants are in operation	3,538	0
(7) Other grants-in-aid related to improvement of nuclear power plant safety	2,995	2,417
(8) Miscellaneous	1,346	1,178
Total, ¥million	69,463	59,873
($million)	(302)	(260)

The sources of funds for the foregoing budget appropriations are the revenues from the electric power development promotion tax, which was instituted in June 1974, when the so-called "Three Laws*" related to electric power development went into effect. The tax is collected from electric utilities at the present rate of ¥0.3 per kwh sold by electric utilities -- split into ¥0.215/kwh (allocated to the special account for electric power resources diversification) and ¥0.085/kwh (allocated to the special account for promotion of the electric power plant siting, referred to above.)

(*) These three laws went into effect on June 6, 1974 in order to expedite power plant construction projects, which had begun to experience construction slowdowns due to strong opposition from local residents, by providing government aid to local areas to encourage their acceptance and cooperation with these projects.

CSO: 4120/61

SJAC TEAM LEAVES FOR SOUTHEAST ASIA

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 p 2

[Text]

An eight-man team of the Society of Japanese Aerospace Companies (SJAC) left Japan in late September to tour Singapore, Indonesia, Thailand, India and Australia until Oct. 15 for study of their aerospace industries.

The tour is part of the SJAC's extensive survey of aerospace industries around the world. In FY 1980 ending last March, it reviewed the present status and future plans of space industries in Japan, North America and Europe. The current fiscal year's survey is planned to focus on developing countries.

Study subjects for the team, led by Managing Director Toshio Saijo of Nippon Electric Co., include space development organizations, space development history (satellites, rockets and other equipment), future space development programs, realities of space industries (output, exports, imports, research and development, personnel, equipment and other aspects), space development budgets, external cooperation in space development, and expectations toward Japan in the five countries.

CSO: 4120/60

MITI TO DEVELOP COMPOSITE MATERIAL TECHNOLOGY

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 pp 2, 3

[Text]

The Agency of Industrial Science and Technology, Ministry of International Trade and Industry, has selected companies which will contract with the Next-Generation Metal and Composite Material Research and Development Corporation to undertake research and development in FY 1981 of lightweight, strong and rigid composite materials for aerospace equipment, automobiles, energy equipment and other machinery.

R&D items and their contractors follow:

Fiber-reinforced plastics (FRP) materials

(1) Development of FRP materials: Toray Industries, Inc., Teijin Ltd. and Mitsubishi Chemical Industries, Ltd.

(2) Development of FRP material processing technology: Mitsubishi Heavy Industries Ltd. (MHI), Kawasaki Heavy Industries Ltd. (KHI), Fuji Heavy Industries Ltd. (FHI), Toshiba Machine Co. and Toyota Motor Co.

(3) Development of engineering technology: FHI

Fiber-reinforced metal (FRM) materials

(1) Development of FRM materials: Toray and Nippon Carbon Co.

(2) Development of FRM material processing technology: MHI, KHI, FHI and Ishikawajima-Harima Heavy Industries Co.

(3) Development of engineering technology: FHI

Development of Quality Evaluation Technology: KHI and Mitsubishi Electric Corp.

Extensive Study on Composite Materials: Next-Generation Metal and Composite Material R&D Corporation.

CSO: 4120/60

SUMITOMO DEVELOPS NEW STRINGER MANUFACTURING PROCESS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 pp 3, 4

[Text]

Sumitomo Light Metal Industries Ltd. has developed a new heat treatment process for manufacturing of aluminum stringer used for aircraft fuselage structures.

The process can improve production yield and mechanical characteristics of products. The company has delivered more than 100 tons of stringer manufactured with the new process to Boeing Co. for large commercial transports, attracting keen attention from domestic and foreign aircraft manufacturers and airlines.

Expecting to expand sales of the improved material to domestic and foreign aircraft manufacturers, the firm has applied for a patent on the new process not only in Japan but also the United States, Canada, West Germany, Britain, the Soviet Union, South Korea and other foreign countries.

Although the fuselage stringer is required to resist fatigue and destruction, the traditional stringer has had problems with bending durability. However, stringer, if treated with the new heat-treatment process in the final manufacturing stage, could solve the problems. The improved stringer is easy to bend.

CSO: 4120/60

THREE FIRMS WORKING ON BADGE PROPOSALS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 p 4

[Text]

Nippon Electric Co. (NEC), Hitachi Ltd. and Fujitsu Ltd. have been working on their proposals for the Air Self-Defense Force's (ASDF) new BADGE automatic air defense system since the JDA solicited a proposal (RFP) on the new BADGE from each of them in August.

The three firms' representatives were invited to the ASDF's Fuchu Base Sept. 17-18 to hear the service's response to their questions on the RFP, which specifies basic requirements for the new BADGE expected to replace the current system in FY 1988. The ASDF intends to answer any questions from them fairly.

The proposals will be submitted to the ASDF by the end of January 1982 for evaluation. The prime contractor for the construction of the new BADGE system will be selected on the basis of the evaluation by the end of FY 1982. The construction will start in FY 1983 for completion in FY 1987.

The ASDF has sought ¥500 million in its FY 1982 budget request for the evaluation of the proposals and the preparation of a detailed construction schedule, in which the U.S. Air Force and Mitre Corp. will cooperate.

The service is expected to earmark the entire sum of the new BADGE construction funds, estimated at a range of ¥150,000 million to 200,000 million, in its budget request for FY 1983.

The new BADGE is designed to improve the ASDF's aircraft detection, tracking, electronic warfare and interception control capabilities with computer capacity increased to meet threats of advanced enemy aircraft.

CSO: 4120/60

STEEL WORKS NAMED FOR VULCAN MODIFICATION

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 p 5

[Text]

Japan Steel Works Ltd. has been named prime contractor for the modification of the ASDF F-104J fighter's 20mm Vulcan machine gun into a ground-use antiaircraft gun system for air base defense.

Nittoku Kinzoku Kogyo, which had been another candidate for the prime contractor, will also take part in the Vulcan modification as subcontractor to undertake modification work on the turret. The prime contractor will take charge of assembly of the whole system.

The Vulcan modification program is to start in FY 1981 on a trial basis with just less than ¥100 million earmarked in the current fiscal year's budget.

Besides the modified Vulcan gun system, the ASDF plans to introduce the 20mm M-167A-1 Vulcan Air Defense System (VADS) for air base defense. After purchasing one VADS for evaluation in FY 1979, it has set aside ¥3,300 million in its FY 1982 budget request for procurement of 16 units for air base deployment through domestic license production. Japan Steel Works is also expected to be awarded the prime contract on the license production.

The ASDF intends to use the Tan-SAM short-range and portable surface-to-air missiles as well as these 20mm machine guns for air base defense. The first Tan-SAMs and portable missiles have been funded under the FY 1981 budget for training.

CSO: 4120/60

PARTIAL FABRICATION OF GRX-3 TORPEDO TO END IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 541, 7 Oct 81 p 9

[Text]

The JDA's Technical R&D Institute (TR&DI) is expected to complete partial fabrication of the GRX-3 short-range antisubmarine torpedo for the Maritime Self-Defense Force (MSDF) by the end of FY 1982 and start the full-scale development of the torpedo in FY 1983. It has earmarked ¥160 million in the JDA's FY 1982 budget request for the GRX-3 program.

The GRX-3, a follow-up to the model 73 and the modified Model 73, is estimated to outstrip the U.S. Navy MK-46. It will be mounted on aircraft or surface ships to attack high-speed, deep-cruising submarines with advanced jamming capabilities.

In FY 1982, the TR&DI is expected to fabricate the propulsion system of the GRX-3 after the body is manufactured in FY 1981.

The TR&DI has also requested ¥2,260 million for the third full-scale fabrication of the GRX-2 long-range homing torpedo and ¥580 million for fabrication of a target tracking system for torpedo tests in FY 1982. The full-scale fabrication of the GRX-2 started in FY 1980.

CSO: 4120/60

MITI ADVISORY BODY TO STUDY Y-XX PARTNER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 4

[Text]

The Ministry of International Trade and Industry (MITI) and the aircraft industry will ask the Aircraft Industry Committee of the Aircraft and Machinery Industry Council, an advisory body, to consider a possible foreign partner for Japan's development of the Y-XX 150-seat-class commercial transport in November.

Candidates for the partner are Boeing Co., the Fokker/McDonnell Douglas (MDC) group and Airbus Industrie, which have already proposed specific aircraft development projects for the Japanese Y-XX program. The Japanese industry at its top-level meeting came up with a plan to make a tentative decision on selection of the partner by the end of November. But MITI thinks that the advisory body as well as the industry should look into the problem before final selection, as was the case with Japan's international development of the Boeing 767 (Y-X).

Prior to the advisory body's consideration, the industry sent a working-level mission to the United States in early October to study details of Boeing's 7-7 and the Fokker/MDC group's MDF-100 programs presented to the Japanese last August. The team is made up of four officials each from Mitsubishi Heavy Industries Ltd. (MHI), Kawasaki Heavy Industries Ltd. (KHI), Fuji Heavy Industries Ltd. (FHI) and the Civil Transport Development Corp. They belong to a special Y-XX committee of the Society of Japanese Aerospace Companies (SJAC).

Top leaders of MHI, KHI and FHI are also expected to visit the United States in late October for the same purpose. Furthermore, FHI, which serves as manager of the Y-XX project, may send ranking officials to visit Airbus Industrie.

Based on the results of the overseas survey and the advisory body's consideration, MITI and the aircraft industry intend to make a final decision on the selection of a foreign partner by the end of this year. But Boeing and the Fokker/MDC group are reportedly expected to decide whether to go ahead with their programs in 1982 or later. They could possibly cancel or delay the programs depending on changes in prospective demand for 150-seat-class transports. Gakuji Moriya, consultant to MHI, said the Japanese should exercise prudence in the selection of a foreign partner. Thus, the possibility exists that the final decision could be delayed beyond the turn of the year.

CSO: 4120/60

KEIDANREN STUDYING MILITARY TECHNOLOGY TRANSFER TO U.S.

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 p 5

[Text]

The Federation of Economic Organizations (Keidanren) will conduct a study on how to cope with the United States' earlier request for transfer of advanced Japanese communications and electronics technologies for military purposes.

Director-General Hiroshi Wada of the Japanese Defense Agency's (JDA) Equipment Bureau, during his U.S. trip in September, told U.S. Defense Department officials that Japan is ready to meet the request. But transfer of the private sector's technologies to the United States could affect Japanese industry. For example, Keidanren has warned that Japan's transfer of very large-scale integrated circuit know-how could in turn increase the U.S. semiconductor industry's international competitiveness to the disadvantage of Japanese industry. Furthermore, the private sector's military technology exports could run counter to the government's arms export ban policy.

Keidanren intends to consider these problems at its Defense Production Committee meeting. A subcommittee on the matter would be set up if necessary.

The Defense Production Committee, chaired by Gakuji Moriya, consultant to Mitsubishi Heavy Industries Ltd., will also collect the defense industry's requests regarding the FY 1981 defense budget and the new FY 1983-87 Medium-Term Defense Program to be drafted by the end of the current fiscal year. The industry is expected to seek increased JDA capital spending for procurement of firearms, ships and aircraft, and for research and development activities.

CSO: 4120/60

JDA TO SIGN MT-X CONTRACT WITH KHI BY MID-OCTOBER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 pp 8, 9

[Text]

Engineers of KHI and two other major airframe manufacturers met at KHI's Gifu Works in early October to discuss the schedule for work on the basic design of the MT-X intermediate trainer for the Air Self-Defense Force, prior to signing a work contract, around mid-October, between the JDA's Central Procurement Office (CPO) and KHI, named as prime contractor, for the MT-X development and production program.

Basic design work is planned to continue until the end of September 1982. The FY 1981 budget earmarks ¥1,596 million for the work, which would be the key to successful development of the new trainer.

After signing the contract, the prime contractor and other two firms -- MHI and FHI -- will organize an engineering team to undertake the basic design work. The team will initially consist of 98 engineers -- 46 from KHI, 29 from FHI and 23 from MHI. KHI's H. Isozaki will serve as chief engineer. The number of engineers is eventually expected to increase to 107 or so.

The engineering team will be divided into seven groups to take charge of planning, cost control, aerodynamics, structure (two groups), equipment and avionics.

CSO: 4120/60

C-130H OVERHAUL CONTRACTOR TO BE SELECTED SOON

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 pp 5, 6

[Text]

The ASDF is expected to select a contractor for overhauling of the Lockheed C-130H tactical transport by the end of October, before the U.S. Air Force mission visits ASDF transport units, training schools and overhauling facilities in November to make recommendations on Japan's C-130H support setup.

KHI, Shin Meiwa Industry Co. and Japan Aircraft Mfg. Co. have declared their candidacy for the C-130H overhauling contractor. The ASDF is now reviewing present and prospective business performance of the three candidates prior to the selection.

The ASDF plans to order 12 C-130Hs under the FY 1980-84 Medium-Term Defense Program to establish a 36-plane transport fleet together with 24 C-1s. The first two C-130Hs, which will enter service in FY 1983 or later, were funded by the FY 1981 budget.

CSO: 4120/60

JDA TO SELECT PRIME CONTRACTOR FOR AW-X DEVELOPMENT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 542, 14 Oct 81 pp 9, 10

[Text]

The JDA plans to select a prime contractor from three firms taking part in the development of the AW-X new anti-aircraft machine gun for the GSDF. Development work is expected to start in FY 1982.

The three firms are Japan Steel Works, Ltd. for the gun barrel, Mitsubishi Heavy Industries Ltd. (MHI) for the chassis and Mitsubishi Electric Corp. for the fire control system (FCS). Japan Steel Works is the most promising candidate for the prime contractor.

So far, the JDA has not named any prime contractors for development and production of ground equipment of that kind. In the absence of prime contractors, the JDA has so far purchased gun barrels and FCS systems for supply to chassis manufacturers.

Under the traditional formula, however, problems could arise with assembly of the complete system, even though each section fulfills its own requirements. Furthermore, contractors' responsibility for projects cannot be specified.

Thus, the JDA has acknowledged that responsible prime contractors should be named for the AW-X project and subsequent ground equipment development programs. It expects the prime contractors to strive to hold AW-X development and production cost to a minimum level. It has also asked MHI and Ishikawajima-Harima Heavy Industries Co. to minimize the respective development costs for the ASM-1 air-to-ship missile and the XF-3 engine for the MT-X new trainer, establishing a policy of giving priority to cost control as well as performance in development of weapons systems.

The GSDF intends to introduce the AW-X by FY 1985 as the replacement for the L-90 35mm twin-barrel gun. The JDA's Technical R&D Institute plans to develop the AW-X by FY 1984 at a cost of ¥5,500 million. It will consist of the existing 35mm antiaircraft gun and the Model 74 tank chassis.

The new gun to be equipped with target detection radar and computerized control systems may be priced at more than ¥800 million. The GSDF wants to procure 100 units in the initial five years, and more later.

CSO: 4120/60

P&W, GE MAKE SPECIFIC PROPOSALS TO JOIN RJ500 PROGRAM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 pp 1, 2

[Text]

Pratt and Whitney Aircraft (P&W) and General Electric (GE) have made specific proposals to Rolls-Royce and three Japanese aircraft engine manufacturers for their participation in the Rolls-Royce/Japan RJ500 aero-engine development program.

The Japanese firms - Ishikawajima-Harima Heavy Industries Co. (IHI), Kawasaki Heavy Industries Ltd. (KHI) and Mitsubishi Heavy Industries Ltd (MHI) -- intend to hold a top-level meeting with Rolls-Royce in late November or December to decide which contender to select as a new partner in the program. Thus, the RJ500 program could develop into a Japan-Britain-U.S. project by the end of this year. The Japanese believe that a U.S. aircraft engine maker's participation in the RJ500 program is indispensable for its success.

P&W has proposed that Rolls-Royce, the Japanese group and P&W each raise 30 percent of aero-engine development funds, with the remaining 10 percent put up by West Germany's Motoren und Turbinen Union (MTU) and Italy's Fiat, which took part in P&W's PW2037 program. The U.S. firm intends to integrate the PW2037 into the RJ500 program.

GE's proposal suggested that development funds be raised equally by the GE/Snecma group and the Rolls-Royce/Japan group.

The Japanese industry and the Ministry of International Trade and Industry believe that the P&W proposal for the three parties' equal participation in the program indicate a major concession by the world's largest aero-engine manufacturer. They also view the GE proposal as acceptable.

The RJ500, which was originally planned for a 120-to-130-seat commercial airliner, is now designed to power a 150-seat-class aircraft that major aircraft manufacturers of the world plan to develop. Its thrust is planned at around 11.3 tons.

P&W and GE had intended to develop engines of a similar type on their own. But they found it difficult to independently raise development funds which could total as much as ¥300,000 million. Furthermore, Boeing Co., which has proposed to develop the 150-seat-class 7-7 jointly with Japan as the Japanese-planned Y-XX, has warned that if the Rolls-Royce/Japan, GE/Snecma and P&W/MTU/Fiat groups develop engines for such aircraft separately, they would have to wage an internecine sales war. These factors have prompted the two U.S. firms to seek participation in the Rolls-Royce/Japan program.

The two U.S. firms' proposals may be studied in detail at the seventh board of directors meeting of Rolls-Royce and Japanese Aero-Engines Ltd., a joint venture for the RJ500 program, in Tokyo on Oct. 22. The Japanese are expected to call on Rolls-Royce at the meeting to select a new American partner as soon as possible in order to secure smooth headway for the program. Some Japanese industry sources said that if a U.S. partner does not take part in the RJ500 program, both the Japanese and Rolls-Royce would have to suspend it. Thus, the final decision on a U.S. partner is expected by the end of this year.

The RJ500 program is now in the initial phase for fabrication of prototypes. Full-scale development work is expected to start next year.

The Rolls-Royce and Japanese Aero-Engines board of directors meeting may also deal with a new Japanese non-profit corporation, founded on Oct. 12 to serve as the main Japanese promotor of the RJ500 program. The new corporation, named Nihon Kokuki Engine Kyokai (Japanese Aero-Engines Corp.), is to receive government subsidies for the project on behalf of the three Japanese aero-engine manufacturers. Capitalized at ¥50 million, it is owned 60 percent by IHI, 25 percent by KHI and 15 percent by MHI. IHI President Taiji Ubukata has taken the post of chairman.

Japanese airframe manufacturers hope the RJ500 will be developed as early as possible, because they see the engine development as a key to promotion of their plan to develop the Y-XX 150-seat-class transport jointly with a foreign partner. Candidates for the partnership are Boeing, the McDonnell-Douglas/Fokker group and Airbus Industrie, which have respectively proposed the 7-7, the MDF-100 and the A320 for the Y-XX program. The Japanese side is expected to select a foreign partner by the end of this year.

CSO: 4120/60

NATION'S AIRCRAFT MATERIAL OUTPUT STILL INSUFFICIENT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 pp 2, 3

[Text]

Japanese aircraft material producers are far less capable than other material manufacturers to meet domestic demand because of insufficient production facilities and technologies, but they have been increasing production actively in recent years, according to a survey report by the Society of Japanese Aerospace Companies (SJAC) on Japan's aircraft materials industry.

The ratio of domestic output to domestic demand is about 20 percent for aluminum alloy, about 60 percent for titanium alloy and about 90 percent for special steel forgings. In the sector of aluminum alloy products, Japanese manufacturers produce only some 10 percent of domestic demand for plates, and 40 to 50 percent for extrusions and forgings. Among titanium alloy products, no plates or extrusions are produced domestically, although the domestic production ratio for forgings stands at a touch more than 70 percent. As a result, Japanese aircraft material manufacturers can supply only 21 percent of the materials for Boeing 767 production.

For Japan's aircraft material consumption, aluminum materials total 3,000 tons per year, accounting for only 0.2 percent of Japan's overall aluminum consumption. The U.S. aircraft industry accounts for 5 percent of the United States' overall consumption. By the year 2000, Japanese aircraft manufacturers' annual aluminum consumption is estimated to increase to 20,000 tons.

Among other aircraft materials, Japan consumes 300 tons each of titanium alloy products and special steel forgings annually.

Domestically-produced aircraft materials are priced about 40 percent higher than imported materials on an average basis. Prices have increased for both domestically-produced and imported aircraft materials for the past several years. For example, prices of domestically-produced aluminum materials shot up 70 to 90 percent from 1977 to 1980. Prices of imported titanium prices tripled in the three years.

CSO: 4120/60

MAJOR MILITARY R&D PROGRAMS PROJECTED FOR FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 pp 5-8

[Text]

The major military research and development programs projected by the Japanese Defense Agency (JDA) for FY 1982 (April 1982-March 1983) are:

Ground-Launched Antiship Missile

The ground-launched antiship missile for the Ground Self-Defense Force (GSDF) will be deployed at GSDF artillery units to attack enemy ships from coastal areas. It will be a ground-launched version of the Model 80 ASM-1 air-to-surface missile. The new missile will have a jet engine instead of a rocket engine for the ASM-1 to triple the target range. This is to be established as a complete weapons system by the end of FY 1981. The JDA's Technical R&D Institute (TR&DI) plans to fabricate a dummy missile, components and ground systems in FY 1982, assemble a complete system in FY 1983 and conduct the missile's technical tests in FY 1985. The development of the new missile is estimated to cost ¥19,000 million.

MT-X New Intermediate Trainer

The MT-X development program is to start with basic design work in the current fiscal year. Detailed design work and partial airframe fabrication are planned for FY 1982, fabrication of four test aircraft for FY 1983-85, and operational tests for FY 1986-87. The MT-X will serve for the Air-Self Defense Force's (ASDF) efficiency pilot training in the 1990s. Total MT-X development cost is estimated at ¥43,000 million.

XJ/ALQ-5/8 ECM Systems

The XJ/ALQ-5 electronic countermeasure (ECM) system will be installed on C-1 transports for ECM training to counter ground warning and control radar, and surface-to-air missile radar systems. The XJ/ALQ-5 development program started in FY 1980. The new system will be fabricated in FY 1982, installed on a C-1 in FY 1984 and tested in FY 1984-85. Total development cost is estimated at ¥3,500 million.

The XJ/ALQ-8 ECM system will be mounted on the F-15J fighter-interceptors to jam aircraft fire control systems, surface-to-air missiles and other electronic systems. In FY 1982, the F-15J airframe will be modified to accommodate the ECM system.

Air Combat Missile

The air combat missile for engineering research is an infrared homing air-to-air missile which will be mounted on fighter aircraft for dogfights. It will be more advanced than the AIM-9L Sidewinder. Partial fabrication was carried out from FY 1978 to 1979 and tests of fabricated parts will be conducted in FY 1981. In FY 1982, the airframe, rocket motor and servo combuster will be fabricated. Partial fabrication will continue in FY 1983 as well. Total research cost is estimated at ¥2,000 million.

Portable SAM

The portable surface-to-air missile for engineering research is designed as a small, lightweight antiaircraft missile for air defense of the Ground, Maritime and Air Self-Defense Forces. It will feature image homing guidance, limitless firing directions and fire-and-forget characteristics. The engineering research on the portable SAM was first funded in FY 1979. In FY 1982, the TR&DI will fabricate a test airframe, a guidance system and other parts, expecting the three SDF services to request engineering development of the new missile in FY 1984. The TR&DI's research cost is estimated to total ¥2,500 million.

IRCCD for New FLIR System

The infrared-charge coupled device (IRCCD) is necessary for the next-generation forward-looking infrared (FLIR) system to improve night battle capability. The IRCCD will also be used for the homing head of the portable SAM. It will feature all-weather capability. The IRCCD research program was first funded in FY 1981. Under the FY 1982 funding, the TR&DI will complete the initial phase of the program. It plans research on a higher-performance IRCCD for FY 1987-88. Total research cost is estimated at ¥2,000 million.

Electronic Warfare Simulator

The radar electronic warfare simulator will be used for research and development of equipment for complicated radar electronic warfare. The TR&DI will start fabrication of an ECM/ECCM (electronic counter countermeasure) simulator and other equipment in FY 1982 after initial research in FY 1979-80 and construction of a building for the simulator in FY 1981. The simulator will become operational in FY 1984. The simulator program is estimated to cost ¥1,400 million.

Future Fire Control System

The TR&DI plans to establish the active phased array antenna technology for a future fire control system (FCS) aboard a fighter to cope with low-altitude flying multiple enemy aircraft. The FCS is also designed for a control-configured vehicle (CCV) aircraft now in development. The TR&DI intends to fabricate the antenna in FY 1981 and commission a private firm to study it in FY 1982. After further research, the antenna will be mounted on an aircraft for airborne tests.

Nike-Phoenix SAM

The TR&DI conducted initial research on the Nike-Phoenix as a candidate for replacement for the ASDF Nike-J surface-to-air missile system in FY 1976-77. It is a mixture of the Nike-J and the Hughes Phoenix air-to-air missile system. In FY 1982, the TR&DI will conduct final research on the new missile system prior to the ASDF's decision on the Nike-J replacement.

New Antimortar Radar

The TR&DI will develop a new antimortar radar as a replacement for the current GE JAN/MPQ-N1 from FY 1982 to 1983. The new radar will use integrated circuits instead of electronic tubes, and detect multiple targets within a wider range. For increased mobility, the new radar can be mounted on vehicles and carried by helicopters.

Towed Array Sonar System

The towed array sonar system (TASS) will have passive dectection capability to make up for a shortfall in the active sonar's submarine search capability. Based on past research results, the TR&DI will fabricate a complete system in FY 1982 and 1983. The TASS development project is estimated to cost ¥1,200 million.

TR&DI TO DESIGN AIRCRAFT SYSTEM SIMULATOR IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 p 8

[Text]

The JDA's TR&DI is eager to get ¥60 million approved under the FY 1982 budget for its initial design work on an aircraft system simulator which is indispensable for future development of aircraft. The simulator program was disapproved under the FY 1981 budget.

If the design work is funded, the TR&DI plans to fabricate the cockpit and the software equipment in FY 1983 and 1984, and the display system in FY 1984 and 1985. Completion of the simulator is expected for FY 1985. Total cost for the four-year simulator construction program is estimated at just less than ¥5,000 million.

The simulator is designed to evaluate all possible new functions and components for small aircraft such as fighters with computers. The TR&DI wants the simulator to have combat simulation capability if possible.

CSO: 4120/60

TR&DI TO DEVELOP NEW TARGET DRONE BY FY 1986

Tokyo JPE AVIATION REPORT-WEEKLY in English No 543, 21 Oct 81 pp 8, 9

[Text]

The JDA's Technical R&D Institute (TR&DI) plans to develop a new target drone for the ASDF from FY 1982 to 1986. It has requested ¥137 million for fabrication of the 300-to-400-kilogram-thrust jet engine for the drone in the initial year or in FY 1982.

In the second year or in FY 1983, the TR&DI intends to start manufacture of several prototype airframes costing ¥1,600 to 1,700 million prior to technical tests in FY 1985-86.

The Ground and Maritime Self-Defense Forces (GSDF and MSDF) as well as the ASDF are expected to adopt the new target drone if it is developed successfully.

The new drone is designed to serve as a target for missile firing exercises using the ASDF's F-15J and F-4EJ fighter-interceptors. For the immediate future, the ASDF intends to introduce the Teledyne/FHI BQM-34J drone for the F-15J's missile exercises. But this drone is priced at as much as ¥150 million. Furthermore, it must be recovered by ships and repaired for repeated use. Thus the BQM-34J has problems with economy. In contrast, the new drone to be developed by the TR&DI will be disposable and priced at less than the ¥30-to-40-million Northrop Chukar-II which the GSDF and MSDF are to introduce.

The new drone will also feature airborne launching, preprogrammed flights and high maneuverability.

If the new drone program is authorized, FHI and KHI would vie as prime contractor for the program. For the jet engine, KHI and MHI are expected to compete for a development contract.

CSO: 4120/60

AIRCRAFT INDUSTRY STUDYING THREE Y-XX PROPOSALS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 pp 4, 5

[Text]

The Japanese aircraft industry has started full-scale studies of three foreign proposals for the Japanese-planned development of the Y-XX 150-seat-class commercial transport aircraft as it has completed negotiations with Boeing Co., the McDonnell Douglas/Fokker group and Airbus Industrie on details of their respective proposals.

It intends to decide by late November which proposal should be adopted for the Y-XX project.

The detailed negotiations with Boeing and the McDonnell Douglas/Fokker group took place in the United States in early October. Four members of the Y-XX special committee of the Society of Japanese Aerospace Companies (SJAC) visited McDonnell Douglas Oct. 6-7 and Boeing Oct. 8-9, returning home Oct. 13. Boeing and the McDonnell Douglas/Fokker group have proposed the 7-7 and the MDF-100 respectively as the Y-XX for joint development. Talks with Airbus Industrie, which has proposed the A320, were held in France when Chairman Iwao Shibuya and other members of the special committee visited there in late September.

While considering the three proposals, the Japanese industry is surveying the possible world market for 150-seat-class transports. The committee is to send a market survey mission to the United States possibly late in October because future aircraft procurement plans of major U.S. carriers, including Delta Air Lines and United Airlines, are seen as a key to the development of the 150-seat-class airliner.

The industry is also considering what aircraft sections the Japanese should undertake in the international development of the Y-XX. It has been consulting closely with MITI, expecting government subsidies for the Y-XX project. If the Japanese take charge of fuselage sections and the main wing fairing, as is the case with the Japan-Boeing-Italy development of the Boeing 767 (Y-X), new investment in plant and equipment could be lowered to reduce financial risks. But the government is not expected to appropriate subsidies for so simple a venture. So far, the industry has come up with no definite policy on Japan's share of the international Y-XX development.

CSO: 4120/60

NEW FIRM TO FABRICATE RJ500 PROTOTYPES IN FY 1981-1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 p 5

[Text]

Japanese Aero-Engines Corp., established on Oct. 12 for Japan's joint development of the RJ500 (XJB) aircraft engine with Rolls-Royce Ltd., will fabricate bench-test versions of the engine in FY 1981-82, taking over business of the XJB office of the Engineering Research Association for Aerojet Engines, according to its business plans.

Running tests of the bench-test engines are scheduled to start in FY 1982.

The new corporation's budget is fixed at ¥4,251.9 million (including ¥2,800 million in government subsidies) for FY 1981, ending in March 1982, and at ¥8,000 million (¥5,400 million) for FY 1982.

Other business planned for the initial two years includes preparation of a detailed RJ500 development schedule; coordination of development work; study of technology; preparation of a detailed design for the bench-test prototypes; preparation of a schedule for testing the fans, low-pressure turbines, and other major engine components; predevelopment tests on the major engine components; fabrication of tools for the tests; manufacture of machine tools for fabricating bench-test engines; and fabrication of spare parts for these engines.

CSO: 4120/60

SHIN MEIWA, NIPPI WILL NOT PARTICIPATE IN MT-X PROGRAM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 pp 5, 6

[Text]

Shin Meiwa Industry Co. and Japan Aircraft Mfg. Co. (NIPPI) are expected to take no part in mass production of MT-X new intermediate trainers for the Air Self-Defense Force (ASDF) starting in 1987. This is because Kawasaki Heavy Industries Ltd. (KHI), as prime contractor for MT-X development and production, cannot afford to let them undertake part of its limited share in the program.

KHI, though named prime contractor for the ¥300,000 million MT-X program, has been given a share of only 40 percent in the program, with Mitsubishi Heavy Industries Ltd. (MHI) and Fuji Heavy Industries Ltd. (FHI) named to undertake the remaining 60 percent equally. KHI's 40 percent share covers the front fuselage section and final assembly. Thus, KHI has no work to subcontract to Shin Meiwa and NIPPI.

Although KHI wants to let Shin Meiwa and NIPPI produce the auxiliary fuel tank, the pylon and other minor parts, the two firms may not be given any substantial subcontracts for the MT-X production.

If no subcontract for the MT-X production is given to Shin Meiwa, it would have to greatly shrink its aircraft division. The airframe manufacturer had expected to receive orders for US-1 rescue flying boats from the Maritime Self-Defense Force (MSDF) and gain a subcontract for the MT-X production. But the MSDF has not sought any US-1s in its budget request for FY 1982. Thus, no work could be given to Shin Meiwa's aircraft manufacturing line.

NIPPI would manage to keep its aircraft manufacturing line operational, thanks to its contracts with the U.S. Forces in Japan for aircraft overhaul.

The MT-X program's development phase is to start in the current fiscal year with work on a basic design.

CSO: 4120/60

SCIENCE AND TECHNOLOGY

THREE FIRMS VYING FOR C-130H AIRFRAME OVERHAUL

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 pp 6, 7

[Text]

KHI, Shin Meiwa and NIPPI have been vying for the ASDF's contract to overhaul the airframe of the Lockheed C-130H tactical transport plane which the ASDF will introduce in FY 1983.

The ASDF and JDA internal bureaus are now facilitating selection of contractors for overhauling the airframe and six other parts of the C-130H, because the contractors must be ready for the visit to Japan, in November, of a U.S. Air Force/Lockheed C-130H survey team.

The selection will be subject to the tentative decision of the JDA Deputy Director-General or Vice Minister for Defense and to JDA's coordination with the Ministry of International Trade and Industry under the Aircraft Manufacturing Industry Law. The final decision will come by the end of October.

The ASDF has nearly settled on contractors for overhauling the six other C-130H parts. They are Ishikawajima-Harima Heavy Industries Co. (IHI) for the engine, Sumitomo Precision Products Co. for the propeller, Tokyo Aircraft Instrument Co. for the auto pilot system, Toshiba Corp. for the inertial navigation system, Tokyo Aircraft Instrument for the flight director and IHI for the fuel control system.

CSO: 4120/60

MITI TO DEVELOP RESOURCES SURVEY SATELLITE

Tokyo JPE AVIATION REPORT-WEEKLY in English No 544, 28 Oct 81 p 10

[Text]

The Ministry of International Trade and Industry (MITI) will start full-scale development of an earth resources survey satellite in FY 1982, with launching projected for FY 1987.

In the initial year, it will complete preliminary design of the satellite system based on past conceptual research. In FY 1983, MITI will begin to prepare a basic design and fabricate the satellite, resources survey sensors, a ground check-out system and tracking/control facilities. If the satellite system enters operation, Japan would become the world's third country to have an earth resources survey satellite following the United States and France. The United States has already launched three Landsat satellites for resources observation, while France has been developing a similar satellite for completion in 1984.

The Japanese satellite will be launched by the new two-stage H-1 rocket, now in development, from the Tanegashima Space Center of the National Space Development Agency (NASDA) in southwestern Japan. The satellite will occupy a solar synchronous orbit at an altitude of about 560 kilometers. The satellite will be equipped with synthetic aperture microradar, optical sensors and other instruments. The synthetic aperture radar will bounce microwaves off the earth's surface and receive reflected waves, even through cloud formations, to collect surface data. The optical sensors will collect three-dimensional data through electronic scanning. Other instruments will include the visible infrared radiation measurement system, which will enable a minimum resolution of only 20 meters, compared with 80 meters for the Landsat. The French satellite has almost the same degree of resolution as the Japanese version.

With the earth resources satellite to detect areas rich in natural resources, MITI expects to satisfy the requests of resource-rich developing countries for Japanese resources survey work and secure a stable supply of resources for Japan from these other nations.

CSO: 4120/60

SEVENTH RRJAEL BOARD MEETING HELD IN TOKYO

Tokyo JPE AVIATION REPORT WEEKLY in English No 545, 4 Nov 81 pp 2, 3

[Text]

The seventh board meeting of Rolls-Royce and Japanese Aero Engines Limited (RRJAEL) held in Tokyo toward the end of October confirmed that it has been discussing possible participation of a third party in the RJ500 engine development program.

The major American aircraft engine manufacturers, Pratt and Whitney Aircraft Division of United Technologies (P&W) and General Electric (GE), have reportedly approached Rolls-Royce Limited of the United Kingdom and three Japanese manufacturers (IHI, KHI and MHI) for possible participation in the Anglo-Japanese engine program targeted for production of medium-size, new-generation aircraft.

No conclusion was reached at the board meeting as to which American manufacturer should be invited to join the program, but it was agreed that the discussion will be continued by top leaders of the British and the Japanese partner companies.

The board of RRJAEL agreed at the meeting that there is a strong requirement for a new 150-seat aircraft with a high technology engine, and confirmed that the RJ500 development program, including manufacturing of the first two demonstrator engines which are due to be run early 1982, and the component rig program have been carried out satisfactorily in accordance with the already approved working schedule.

Prior to the board meeting, top executives of the British and the Japanese manufacturers had reportedly agreed that the full launching of the engine development, which was scheduled to begin in December 1981 would be delayed, judging by the current situation for new 150-seater aircraft development programs being planned by world aircraft manufacturers. It was also agreed that the present basic agreement covering the activities of the joint venture company would accordingly be extended for another year.

CSO: 4120/60

CTDC TO DRAFT BASIC Y-XX DESIGN BY MARCH

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 3, 4

[Text]

The Civil Transport Development Corp. (CTDC) is hopeful of drafting a basic design for the Y-XX new 150-seat-class commercial transport by the end of March 1982.

CTDC's Y-XX development preparation office has been working on the basic design since last August, while the Japanese aircraft industry has been seeking a foreign partner for joint development of the aircraft. This is because Japan should have its own design in order to make future negotiations with the partner favorable to the Japanese. Funds set aside for the basic design work total ¥470 million, of which government subsidies account for 75 percent. The Japanese industry intends to launch full-scale development work on the Y-XX in FY 1982 with funds aggregating ¥2,000 million, including government subsidies.

The basic design work has been undertaken by two engineers each from Mitsubishi Heavy Industries Ltd., Kawasaki Heavy Industries Ltd. and Fuji Heavy Industries Ltd. Wind tunnel and fatigue tests may be conducted as part of the work. Improved fuel efficiency and noise reduction are planned as main features for the new transport.

Three new aircraft have been proposed by foreign aircraft manufacturers for Japan's Y-XX. They are the Boeing 7-7 of Boeing Co., the MDF-100 of McDonnell Douglas Corp. and Fokker, and the A320 of Airbus Industrie. These aircraft have been devised in line with requirements of potential U.S. users, including Delta Air Lines and United Airlines.

The foreign partner for the Y-XX development program will be selected from these manufacturers.

CSO: 4120/60

MT-X PROGRAM TO COST FORTY-THREE BILLION YEN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 pp 8, 9

[Text]

The JDA's TR&DI has revised the estimated cost for the seven-year development of the ASDF MT-X new intermediate trainer from the original ¥37,200 million in FY 1980 prices to ¥43,000 million at FY 1981 prices.

But this estimate does not include the cost for fabrication of five prototypes of the XF-3 small turbofan engine which is now in development for the MT-X. If the XF-3 is formally named to power the new trainer, the cost would be incorporated into the MT-X program cost. As a result, the actual overall cost for the MT-X development program would reach nearly ¥50,000 million.

The initial MT-X program funding, furnished in FY 1981, totaled ¥1,596 million for work on the basic MT-X design. In the FY 1982 budget request unveiled late last August, the TR&DI sought ¥7,358 million for basic and detailed design work plus fabrication of full-size mock-up and front fuselage sections for tests.

In FY 1983, TR&DI will request funds for fabrication of four prototype aircraft for technical and operational tests between late FY 1985 and FY 1987 when the MT-X development program will be completed.

CSO: 4120/60

GRX-2 TORPEDO DEVELOPMENT TO BE COMPLETED BY FY 1984

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 p 9

[Text]

The JDA's Technical R&D Institute (TR&DI) plans to complete the development of the GRX-2 high-speed long-range homing torpedo for the MSDF by FY 1984 at a cost of ¥11,800 million.

TR&DI has asked the Ministry of Finance to earmark ¥2,260 million in the FY 1982 budget for final full-scale fabrication. Technical tests are planned for late FY 1983 and operational tests for FY 1984 before service entry certification.

The TR&DI has designed the GRX-2 for mounting on submarines to attack deep-cruising, high-speed enemy submarines with high accuracy. The GRX-2 was adopted for research in FY 1970. Its full-scale development started in FY 1980.

The TR&DI has also been developing the GRX-3 (modified Model 73) short-range torpedo for aircraft and surface ships.

Authorized funds for the two torpedo development programs totaled ¥2,400 million in FY 1980 and ¥4,600 million in FY 1981. For FY 1982, the TR&DI has requested ¥3,000 million, including ¥2,260 million for the GRX-2 program. In addition, it has sought ¥580 million for a target tracking system which would be used for testing torpedoes.

CSO: 4120/60

GUIDED WEAPONS FOR R&D IN FY 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 545, 4 Nov 81 p 10

[Text] The JDA's Technical R&D Institute (TR&DI) in its FY 1982 budget request has sought ¥9,635 million, including ¥8,109 million for disbursement from FY 1983 on, for eight research and development programs for guided weapons systems, such as the XSSM-1 ground-launched antiship missile for the GSDF, the Chu-MAT medium-range antitank missile for the GSDF, the air combat missile for the ASDF and the portable surface-to-air missile for the three services.

The XSSM-1 development program is estimated to cost ¥19,000 million, of which the TR&DI has earmarked ¥7,760 million in the FY 1982 budget request for fabrication of dummy components and ground systems. Fabrication of a full system will start in FY 1983. The program is planned for completion with technical tests in FY 1985. The GSDF will use the XSSM-1, based on the ASDF ASM-1 air-launched antiship missile, for coastal defense.

The laser semiactive Chu-MAT antitank missile will be developed at a cost of ¥8,000 million by FY 1984. The FY 1982 budget request earmarks ¥62 million for the first-phase fabrication.

The air combat missile program is planned to go into full-scale development stage in FY 1985 after technical research between FY 1978 and 1984. The FY 1982 budget request includes ¥540 million for part of the technical research. This missile will be used for fighter aircraft dogfights with intruding planes. It will be an advanced infrared guided missile to replace the AIM-9L Sidewinder. Its research and development costs are estimated to total ¥2,000 million.

Technical research on the image-homing portable SAM has been under way since FY 1979. In FY 1982, a prototype will be test-fired, with past research results evaluated. Funds for such work in FY 1982 total ¥260 million. Full-scale development is expected to start in FY 1984. Overall costs for the portable SAM research and development are estimated at ¥2,500 million.

CSO: 4120/60

END

JPRS 79687

18 December 1981

Japan Report

No. 139

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79687

18 December 1981

JAPAN REPORT

No. 139

CONTENTS

POLITICAL AND SOCIOLOGICAL

Observers' Comment on Tasks of New Government
(KYODO, 30 Nov 81)... 1

Soviet Envoy on Relations With Japan, PRC
(KYODO, 3 Dec 81)... 3

MILITARY

ASDF Completes Operational Tests of F-15
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 4

MSDF To Fix Specificiations for DDG, AS
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 5

Three Firms Preparing Badge Proposals
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 6

Outline of KHI's Gas Turbine Engine Programs
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 8

IHI Delivers First XF-3-30 to JDA
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 10

GSDF May Procure 40 Tan-SAMS Under New MTDP
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 12

SCIENCE AND TECHNOLOGY

Six Defense Contractors' Secret Business Alliance on Badge System
(ZAIKAI, 8 Sep 81)... 13

White Paper on Communications Issued
(KYODO, 27 Nov 81)... 19

MDC/Fokker Executives Arrive in Country
(JPE AVIATION REPORT WEEKLY, 11 Nov 81)........................ 21

KHI Named Contractor for C-130H Airframe Overhaul
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 22

KHI Launches MT-X Development
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 23

JDA To Negotiate XF-3 Contract With IHI
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 25

Komatsu Picked as Prime Contractor for 203mm HSP
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 27

TR&DI Plans Airborne XF-3-30 Tests for June 1982
(JPE AVIATION REPORT-WEEKLY, 11 Nov 81)........................ 28

MITI, Industry Haggling Over Y-XX Partner
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 29

Flying Boat Development To Cost 36,9 Billion Yen
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 31

MHI To Take Care of YS-11 Support, Servicing
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 32

New Air Combat Missile to Use High Technology
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 33

New 155mm HSP To Be Developed for GSDF
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)........................ 34

MELCO Fabricates Satellite Control System
(JPE AVIATION REPORT-WEEKLY, 18 Nov 81)......................... 35

Briefs

Y-XX Market Survey in U.S. 37
Business Jet Certificated 37

The diplomatic tug-of-war has pushed Tokyo-Seoul ties to the lowest point in months.

The observers said the new Suzuki government will also seek a breakthrough in the current stalemated relations with the Soviet Union.

The new government will map out its Middle East policy on the occasion of the scheduled visit to Tokyo in January by Saudi Arabia's Crown Prince Fahd as its first top foreign guest, they added.

CSO: 4120/81

SOVIET ENVOY ON RELATIONS WITH JAPAN, PRC

OW031013 Tokyo KYODO in English 0940 GMT 3 Dec 81

[Text] Tokyo, 3 Dec (KYODO)--Soviet Ambassador to Tokyo Dmitriy Polyanskiy Thursday called on Japan to take the initiative in improving relations between the two countries.

Speaking at a seminar here, Polyanskiy said that Soviet-Japan relations constitute a substantial factor in the Far East.

He noted that 25 years have passed since the two nations restored diplomatic relations and said the development of good-neighborly relations would contribute to peace and security in the Far East and Asia as a whole.

Polyanskiy said, however, the process of creating an atmosphere of good-neighborhood concerns both countries.

"We hope that foresight and the understanding of its own interests will prevail in Japan," the ambassador said, adding:

"So far as the USSR is concerned, it is unchangeably in favor of true good-neighborly relations with Japan."

Polyanskiy said the Soviet Union has always called for normalization of its relations with china.

"It is our belief that there are no problems that cannot be solved between our two countries if there is goodwill," he said.

"Unfortunately," he said, "at present no change is seen in the policy of the Chinese leaders. Nevertheless, the Soviet people do not give up the hope that common sense will prevail in Beijing and that the relations between our two countries will enter a normal course."

CSO: 4120/81

MILITARY

ASDF COMPLETES OPERATIONAL TESTS OF F-15

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 7-8

[Text] The ASDF's Air Proving Wing has completed operational tests of two F-15J fighter aircraft, which started last May. The test results will be reported to the Air Staff Office by early December.

In the tests, the Air Proving Wing made 100 flights, including 10 for familiarization, 25 for testing flight characteristics, 15 for testing avionics, 25 for testing the radar warning system, and 20 for testing the data link.

Priority was given to the APR-4 radar warning system and the data link in the tests because the other matters had been tested fully by the U.S. Air Force before delivery of the two planes to Japan. The tests on the two priority items are believed to have produced satisfactory results.

The Air Proving Wing will continue to use the two F-15Js for further tests to solve operational problems and suggest possible modification. A hangar and noise suppressors for the two aircraft have already been completed. The noise suppressors can hold engine test noise within a range of 500 meters down to 70 decibels or less, enabling nighttime engine tests.

Meanwhile, an ad hoc F-15J squadron, to be organized in December, will start training of F-15J pilots with four F-15DJ trainers in April 1982. The ASDF's F-15 pilots will total 13 when the sixth and last group of trainees ends training in the United States soon. These pilots will become instructors for training student pilots in Japan.

Trainees will be selected from F-86, F-104J and F-4EJ pilots. A training syllabus for their shift to the F-15J is now in preparation.

The number of F-15DJ two-seat trainers will increase from four at the end of FY 1981 to six in FY 1982 and eight in FY 1983.

CSO: 4120/72

MSDF TO FIX SPECIFICATIONS FOR DDG, AS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 p 8

[Text]

The Maritime Self-Defense Force (MSDF) is to prepare basic specifications in early November for a 4,500-ton DDG guided missile destroyer and a 3,600-ton AS submarine tender, with construction starting by the end of FY 1981.

If the basic specifications are approved by the Minister for Defense (JDA Director-General) smoothly, constructors of the ships would be decided in mid-November.

The new DDG is designed for area defense missions as the major vessel of a sophisticated escort flotilla. Its equipment will include Harpoon antiship missiles and CIWS systems. The JDA has concluded a contract with the United States to purchase this equipment through the Foreign Military Sales channel. Its gas turbine powerplant will be a combination of the Rolls-Royce Marine Olympus and Spey engines which will be manufactured by KHI under license.

The new AS will be equipped with a deep submergence rescue vehicle (DSRV) to modernize submarine rescue operations. The DSRV is incorporated into the FY 1982 budget request.

Meanwhile, the MSDF is to start a fleet rehabilitation and modernization program for the destroyer Takatsuki in the current fiscal year. But the FY 1981 budget covers only purchase of new equipment, including Harpoon missiles and towed array surveillance systems. Test modification of the destroyer is planned for funding in FY 1982.

CSO: 4120/72

THREE FIRMS PREPARING BADGE PROPOSALS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 3-4

[Text]

Nippon Electric Co. (NEC), Fujitsu Ltd. and Hitachi Ltd. have started preparation of proposals for a new BADGE air defense system for the Air Self-Defense Force (ASDF) after studying the ASDF's detailed requirements and reports drafted by the U.S. Air Force and Mitre Corp. The proposals will be submitted to the ASDF by late January.

The three firms are now vying for the BADGE contract on almost even terms, although NEC had demonstrated its superiority over the others by forming an alliance with Mitsubishi Electric Corp., Toshiba Corp., Oki Electric Industry Co. and Nippon Avionics Co. before the Japanese Defense Agency (JDA) requested the three firms' proposals last Aug. 7. NEC has built the existing BADGE system in cooperation with Hughes Aircraft Co.

The JDA has taken care to make the three contenders stand on even ground so that they can all propose low-cost systems. It has allowed system designers of the three companies to look into the entire BADGE system by visiting the Air Defense Command, radar sites and other facilities. It has also briefed the three firms' representatives on detailed requirements.

Due to the JDA efforts, NEC will not necessarily hold any superiority over Fujitsu and Hitachi. The JDA is expected to select, as the BADGE prime contractor, the company proposing the lowest cost and the best system.

The ASDF requirements demonstrate its intention to minimize the cost for the new BADGE construction program. Therefore, the value of the program is now estimated lower than the originally planned ¥700,000 million. The hardware alone is estimated at only ¥70,000 million.

The current BADGE system has been built and maintained by Nippon Avionics, a joint venture of NEC and Hughes, with the software provided by the U.S. company. The NEC/Hughes/C. Itoh & Co. group won the BADGE contract in competition with the Litton/Mitsubishi Electric/Fujitsu/Nissho Iwai group and the General Electric/Toshiba/Mitsui group.

The new BADGE system would have to depend on a U.S. firm for supply of the software, though the hardware will be manufactured domestically. NEC still maintains a tie-up with Hughes to win the new BADGE contract. Fujitsu has teamed up with General Dynamics and Hitachi with System Development.

CSO: 4120/72

OUTLINE OF KHI'S GAS TURBINE ENGINE PROGRAMS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 5-6

[Text]

Kawasaki Heavy Industries Ltd. (KHI) is now manufacturing seven Rolls-Royce Marine Olympus TM3B and nine Tyne RM1C gas turbine engines ordered in FY 1979 for the Maritime Self-Defense Force's (MSDF) new DD and DE destroyers.

KHI will delivery four Olympus engines and as many Tynes to the Defense Agency in April 1982, two Olympuses and as many Tynes in June 1982 and one Olympus and three Tynes in March 1983. It had already completed delivery of three Olympuses and as many Tynes, ordered in FY 1978, last June.

KHI is also preparing for production of five Olympuses and four Tynes as ordered in FY 1980.

The Marine Olympus and the Marine Tyne were first adopted for a 2,900-ton DD and the Olympus for a 1,200-ton DE funded in FY 1977. The DD is powered by two Olympuses and as many Tynes, while the DE is equipped with one Olympus and a 6DRV diesel engine.

The MSDF plans to install a COGAG (combined gas turbine and gas turbine) system consisting of two Olympus and as many Marine Spey SM1A gas turbine engines in a 4,500-ton DDG guided-missile destroyer funded in FY 1981. KHI has already been named to manufacture this COGAG system.

As for aircraft engines, KHI is now manufacturing seven T53-K-13B engines, a T53 test stand and some J33/J80506 engines, all of which were ordered in FY 1980. Of the seven T53-K-13Bs, five will be completed by January 1982 and two by March 1982.

As a subcontractor of Ishikawajima-Harima Heavy Industries Co., KHI is producing parts of 35 F100s and 15 T56s ordered in FY 1978. Their delivery will be completed by February 1982. It also received orders for parts of 90 F100s and 15 T56s in FY 1980 with delivery completion scheduled for February 1984.

In addition, KHI is manufacturing parts of Rolls-Royce RB211s and Lycoming engines for Boeing and other aircraft.

Overhaul work is now under way on 101 engines for delivery by the end of FY 1981.

KHI is also taking part in a program of the Engineering Research Association for Aero-jet Engines (ERAAE) for development of the FJR turbofan engine for an experimental STOL (short takeoff and landing) aircraft. In the current fiscal year, KHI was given a ¥1,310 million contract for fabrication of two FJR engines for delivery in May 1982 and March 1983. They will be installed in a C-1 transport modified into the experimental STOL aircraft. Another ¥1,703 million contract was awarded to KHI in the current fiscal year for tests of the FJR engine.

CSO: 4120/72

MILITARY

IHI DELIVERS FIRST XF-3-30 TO JDA

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 6-7

[Text]

Ishikawajima-Harima Heavy Industries Co. (IHI) delivered the first of the five XF-3-30 small turbofan engines for pre-flight rating tests (PFRT) to the JDA's Technical R&D Institute (TR&DI) in late October.

IHI and the TR&DI have been developing the XF-3 as a possible powerplant for the MT-X new intermediate trainer. Before the XF-3-30 test engine, IHI fabricated the XF-3-1 as the first demonstrator engine in FY 1975 and the XF-3-20 as the second one in FY 1978.

The five XF-3-30s were ordered in FY 1980. Following the first XF-3-30, the second one will be delivered to the TR&DI in November, the third in January 1982, the fourth in April and the fifth in June. The pre-flight rating tests are to start in November with the first one.

The TR&DI plans to order four more XF-3-30s from IHI for PFRT in the current fiscal year. Negotiations on the order are now under way between the JDA's Central Procurement Office and IHI.

Of the nine XF-3-30 engines, the first one is designed for durability tests, the second for over-rotation tests, the third for distortion tests, the fourth for airborne tests on a flying test bed aircraft, the fifth for altitude flight tests, the sixth for flying test bed tests, the seventh for altitude flight tests, the eighth for foreign object damage tests, and the ninth for a 60-hour running test.

Although these tests are scheduled to be completed by October 1983, the TR&DI intends to end the key part of the tests before October 1982 when a decision on the MT-X engine will be made. IHI and the TR&DI hope that the JDA will adopt the XF-3, which features low bypass ratio, light weight, fuel efficiency and low noise.

If the XF-3 is selected as the MT-X engine, the JDA would seek funding for fabrication of five XF-3 engines as well as four MT-X airframes in FY 1983. The five are planned for final durability and environmental tests before mass production.

CSO: 4120/72

MILITARY

GSDF MAY PROCURE 40 TAN-SAMS UNDER NEW MTDP

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 p 7

[Text]

The Ground Self-Defense Force (GSDF) is expected to seek funding for 40 batteries of Tan-SAM short-range surface-to-air missiles for air defense of divisional areas under the FY 1983-87 Medium-Term Defense Program (MTDP).

The GSDF's introduction of the domestically developed Tan-SAM started in the current fiscal year with four batteries funded for training. For FY 1982, it has requested two batteries for training and six for front-line deployment. Tan-SAMs for the FY 1983-87 MTDP, which will be prepared next year, will mainly replace the 75mm antiaircraft guns for air defense of GSDF divisions.

The GSDF is also expected to request funding for about 220 sets of General Dynamics Stinger portable SAMs for air defense of tank and artillery units under the new MTDP. Introduction of the portable SAM coincided with that of the Tan-SAM in FY 1981. Following the first 14 sets for training funded in the current fiscal year, the service has requested 46 sets for front-line units for FY 1982.

The GSDF expects to subject the Stinger portable SAM to domestic license production depending on the procurement amount to be stipulated in the new MTDP.

CSO: 4120/72

SCIENCE AND TECHNOLOGY

SIX DEFENSE CONTRACTORS' SECRET BUSINESS ALLIANCE ON BADGE SYSTEM

Tokyo ZAIKAI in Japanese Vol 29 No 19, 8 Sep 81 pp 100-103

[Text] It apparently was something that not even the Japan Defense Agency (JDA) had foreseen.

The idea that the Nippon Electric Company (NEC) and Mitsubishi Electric Corporation, which had been engaged in a furious battle over who would become the prime contractor for the next Base Air Defense Ground Environment (BADGE-X), a system predicted by some to cost as much as 300 billion yen, would join hands at the stage that the performance specifications were passed out was something that had never been considered.

No one in his wildest dreams had thought that these two would be joined also by Toshiba Corporation and Oki Electrical Industry Company and that these four then would attempt to form a "six-company alliance" with Hughes Corporation of the U.S. and Japan Avionics Corporation (a joint venture of Huges and NEC).

The JDA was prepared to give the performance specifications for the BADGE-X--a system of computers and telecommunications--to the six [sic] domestic computer companies possessing system design capabilities: Fujitsu Ltd., Hitachi Ltd., NEC, Toshiba, and Oki Electrical.

The performance specifications were given to Fujitsu, Hitachi, and NEC on the afternoon of 7 August, but the JDA had notified all of the companies the previous day, "the performance specifications will be presented tomorrow, so please be there."

Mitshubishi Electric, of course, was also notofied by the JDA, but it had already decided by that time to join hands with NEC. Therefore, First Operations Division Chief Takeshi Abe, who is in charge of business involving defense-related equipment, visited the JDA on the morning of 7 August and explained the situation: Mitsubishi would "do it with NEC."

Toshiba and Oki Electrical said the same.

So, there was this flurry of activity, and the JDA ended up presenting its performance specifications to only three companies.

Hearing of the formation of a six-company alliance centering on NEC and Mitsubishi, the leader of a certain defense equipment manufacturer revealed these thoughts:

"Quite frankly, I was surprised. Although it is still only the stage of presenting performance specifications, one gets the feeling that 'the game is over,' I say this because the present BADGE system is being handled by the three companies of NEC, Hughes, and Japan Avionics; if you add Mitsubishi, which has a large amount of orders from the JDA, and furthermore, Toshiba and Oki Electrical to this NEC group, it will mean a union of all those companies with proven track records in relations with the JDA. This seems, does it not, to have placed Fujitsu and Hitachi, which are latecomers in dealing with the JDA, in a difficult position."

Performance specifications are an explanation of what performance the JDA wants in the BADGE-X system. Fujitsu, Hitachi, and NEC will read the perfroamance specifications, which are said to stack up one meter high, and then they will present within six months a "proposal" which would meet these specifications. That would be the end of January of next year.

The JDA will look over the proposals of the companies and will make its decision on BADGE-X by the time next summer that the preliminary budget requests for FY 1983 are to be drawn up. Delivery of the system is to be in FY 1987.

The corporate battle over BADGE-X, which is to be the nucleus of Japan's defense system, should really be starting in earnest now, but the formation of the "six-company alliance" around NEC and Mitsubishi will influence greatly the outcome of this battle.

Toshihiko Saijo, former chief of the Communications Section of the JDA's Equipment Bureau, and now executive director of NEC, had this to say about the formation of the six-company alliance: "We are handling now the present BADGE system jointly wit the Hughes Corporation; in May of 1979, we set up an Office of Special Integrated Systems where we have been dealing with BADGE-X ever since. In the case of BADGE-X, it was our view that what could be produced in Japan should be produced in Japan, and that Japan's air defense system had to be the optimum system. In order to produce the optimum system, therefore, we thought that it would be best to have companies with experience in each of the fields join together and combine their strengths. When you think about it, the combining of these six companies is an 'inspiration'".

In actuality, JDA orders for electronic equipment placed with NEC, Mitsubishi, Toshiba, and Oki Electrical together make up two-thirds of the total orders for such equipment.

According to the JDA-produced ranking of companies by procurement totals for FY 1980, the top 10 companies, from first to tenth, were: (1) Mitsubishi Heavy Industries, Ltd. (234.5 billion yen); (2) Ishikawajima-Harima Heavy Industries Co., Ltd. (108.4 billion); (3) Kawasaki Heavy Industries, Ltd. (81.2 billion); (4) Mitsubishi Electric (72.3 billion); (5) Toshiba Corporation (32.9 billion); (6) NEC (22.3 billion); (7) Ito Chu Aviation (14 billion); (8) Nippon Oil Co., Ltd. (12.9 billion); (9) The Japan Steel Works, Ltd. (12.2 billion); and (10) Sumitomo Shipbuilding and Machinery Co., Ltd. (12 billion).

The reality of the "six-company alliance" is that the fourth, fifth, and sixth-ranked companies have joined forces. Furthermore, these three have been joined by the Hughes Corporation, the company with the best record in the world with BADGE systems, having received orders for 20 systems and having 12 systems in operation. Fujitsu and Hitachi are saying that they also "will do their utmost to obtain the contract," but the view that "the six-company alliance already has the decision sewn up" is gaining currency within defense industry circles.

The decision to unite NEC and Mitsubishi Electric, one which will have a great impact on the fight over BADGE-X, was made ultimately in a high-level meeting at the end of July between Takeshi Kawahaski, Vice President of NEC, and Koji Imakita, Vice President of Mitsubishi.

NEC called for such a union in the middle of July, and the formation of a six-company alliance centered on NEC and Mitsubishi was arranged quickly within the short span of two weeks.

The "Top Secret" Performance Specifications

BADGE is an acronym for "Base Air Defense Ground Environment."

Put simply, BADGE is a system which uses computers to distinguish instantly whether flying objects caught on the 28 radar sites throughout the country are friendly aircraft, commercial aircraft, or unidentified aircraft, and in the case of an unidentified aircraft, to decide immediately, on the basis of that aircraft's flight path and the location of friendly aircraft, how it should be intercepted.

The commander will decide whether or not a scramble will take place; however, BADGE will guide an intercepter to the enemy aircraft and will give a command to missle on the ground to intercept the enemy.

The nerve center of the existing BADGE system is located within the Air Defense Command at Fuchu near Tokyo.

The decision to introduce the existing system was made in 1963, some 18 years ago. Equipment acquisition was completed in 1967, and the system went into operation in 1968 after a one-year test period.

The corporate battle over this BADGE system involved a three-way struggle between three groups: The General Electric, Toshiba, and Mitsui and Co., Ltd. group; the Litton, Mitsubishi Electric, Fujitsu, and Nissho-Iwai Co. group; and the Hughes, NEC, and C. Itoh and Co. group. Ultimately, the Hughes system was selected. During this fight, however, Colonel Kenkici Kawasaki, Chief of the Defense Section of the Air Staff Office, was arrested for "revealing secrets," and his superior, General Hifumi Yamaguchi, committed suicide.

It will be almost 20 years since the decision was made to introduce the present BADGE system; electronic equipment has made incredible progress over these years, and the advances in aircraft have been astounding as well. In addition, the "MIG incident" of five years ago, which involved Lt. Belenko, revealed the system to be defective in that it could not catch aircraft intruding at a low altitude.

It was clear by then that an improvement in the system could not be avoided. In its Medium-term Defense Buildup Estimate drawn up in 1978, the JDA discussed BADGE-X; it then spent the next two years working on writing up the performance specifications.

Having learned from the experience of the tremendous corporate struggle over the present BADGE system, the JDA has avoided all contact with private business and has carried out its work with great circumspection. The manufacturers, for their part, have welcomed into their firms a large number of ex-JDA officials and officers and have strived to build pipelines into the JDA. They have been trying to discover what the JDA will require in the way of performance specifications.

The performance specifications which the JDA presented to Fujitsu, Hitachi, and NEC on 7 August are said to stand more than one meter in height; their contents are top secret.

At present, the three companies are studying the contents in great detail, and they are keeping silent as to what has been asked of them.

In the light of past history, however, these specifications apparently emphasize improving the ability to respond to and to handle intruders and increasing computer capacity. Also, the new system is supposed to be able to link up with the early warning aircraft, the E2C, with which the existing system is not linked, and to be able also to deal with low-flying intrurers which cannot be caught on radar.

The existing BADGE system cost a total of 25 billion yen, but BADGE-X, because of the increase in the fuctions and the system, is expected to cost from 200 to 300 billion yen.

The Grand Alliance Formed by NEC.

Even within the are of electronics, which is considered to be advanced technology, that involving defense and space requires particularly advenced technology. Working on BADGE-X would be a tremendous plus for a company because it would help to develop technological ability.

Because of this very fact, therefore, the domestic computer manufacturing companies began very early to gear up for the struggle to become the prime contractor for BADGE-X. NEC, which is handling the existing system, created a "Defense Business Division" last year on the heels of its "Office of Special Integrated Systems."

Mitsubishi Electric established a new "Office for Defense Systems Projects" in November of last year. In December of 1979, Fujitsu inaugurated its "Office of Defense Equipment;" and in January of this year, it set up a subsidiary company, called the "Fujitsu Systems Comprehensive Research Institute," for the purpose of defense-related R and D. Fujitsu Vice President Taiichiro Shin was appointed President of the new company.

In the case of Hitachi, and "Office for the Promotion of Defense Technology" was created in August of 1980.

Toshiba, on the other hand, has not created any special organization, but it claims to have "developed an organizational system which can respond to any situation."

Although each company argued that it alone should be the prime contractor, all realized that, because of the scale of BADGE-X and because it was a system requiring special defense-related know-how, it would be difficult for one company to handle it all alone.

Therefore, from the beginning of this year, and as the time for the presentation of performance specifications drew near, rumors began to circulate that Mitsubishi Electric and Fujitsu were going to join hands, or that Fujitsu and Hitachi were going to join hands.

However, the idea of NEC and Mitsubishi joining together was never considered. It was strongly believed that, in the light of past experience, the fight over BADGE-X would be between these two companies, NEC and Mitsubishi Electric.

At the working-level, however, there was an awareness of the merits of a union between NEC and Mitsubishi.

In the middle of July, therefore, NEC suggested to Mitsubishi that they join hands together in a formal alliance.

The Kawahashi-Imakita Meeting and a Decision

When Mitsubishi Electric received the proposal from NEC, it was acknowledged by both President Nichachiro Katayama and Chairman Sadakazu Shindo. Then at the end of July, somewhere in the city, Vice President Koji Imakita, the man in charge of defense equipment, met with NEC's Vice President Takeshi Kawahashi.

According to the accounts of those involved, this high-level meeting between the two vice presidents resulted in a decision that "there are few areas in which NEC and Mitsubishi Electric compete with each other, and that in order to make the best system possible for BADGE-X, which has such great importance for Japan's defense, we should cooperate together in doing it."

Actually, NEC not only is involved in the present BADGE system, but has experience in telecommunications as well. As for Mitsubishi, it is involved in radar, missiles, and the fire control mechanism for the F15 jet fighter. If the two companies were to join hands, a better system could be made than if they tried to do it separately. This truth was also affirmed at the meeting that day. Furthermore, it was agreed that, in order to make the optimum system, Toshiba and Oki Electrical, which have experience in defense-related matters, would be invited to join the group.

Toshiba has a cooperative relationship with NEC in the area of computers, and Oki Electrical in the past has engaged in the joint development of computers with Mitsubishi Electric. Even now, Oki Electrical has a close relationship in the area of peripheral terminal equipment. These relationships were very useful for getting the companies together.

There were some voices within Mitsubishi urging the company to try and obtain the contract on its own; ultimately, however, it joined hands with NEC in order to make the best system possible.

At the same time that NEC decided to join with Mitsubishi, it also asked Toshiba, with which it had a cooperative relationship in computers, and Oki Electrical, which had a close relationship with Mitsubishi, to joing the group.

Toshiba and Oki Electrical both said that they wanted to try and become the prime contractor on their own; in truth, though, they both wanted to link up with somebody else. Therefore, NEC's proposal for a union was truly the answer to their prayers.

Four domestic computer companies experienced in defense-related electronic equipment joined with the Hughes Corporation and Japan Avionics to form a six-company alliance. This was the result also of the shrewd calculations of NEC which, in addition to working on the present BADGE system, wanted very much to be involved in BADGE-X.

In order for NEC to become the prime contractor for BADGE-X, it had first to construct an unbeatable organization so as to be able to turn away the latecomers, Fujitsu and Hitachi. Therefore, it brought Mitsubishi Electric and Toshiba, which have proven track records in defense-related matters, into its own camp and formed a grand alliance.

Mitsubishi and Toshiba responded to NEC's proposal because they calculated that their participation in BADGE-X could be obtained more certainly by such a move. The corporate battle over BADGE-X has only just begun, and there is little doubt that the attacks from Fujitsu and Hitachi will surely come. With the formation of the "six-company alliance," however, one can say that the response to these attacks has already appeared.

9844
CSO: 4105/236

WHITE PAPER ON COMMUNICATIONS ISSUED

OW270349 Tokyo KYODO in English 0327 GMT 27 Nov 81

[Text] Tokyo Nov 27 KYODO--This year's white paper on communications proposed Friday to introduce communications satellite technology into anti-disaster measures in an emergency.

Posts and Telecommunications Minister Ichiro Yamanouchi presented the report on communications for fiscal 1981 before a cabinet meeting Friday and the report was approved.

The annual report also proposed to study connecting communication networks of the National Land Agency, the Construction Ministry and the Fire Defense Agency to make them useful in the event of an emergency.

The report on the main theme "Disaster and Communications" described communication media in recent years as "the central nerve in the society" which has permeated through social and family life as well as business activities.

The report mentioned countermeasures against disasters by means of various communication media such as data communications, telephone, television and radio, in view of their respective characteristics.

In the case of international communications, the ministry plans to set up central stations in Tokyo and Osaka to divide operating functions and to build a central station in Oyama, Tochigi Prefecture, northeast of Tokyo, to start operation in 1985, the report said.

The ministry is also doubling communication transmission routes from the present single route for both international and domestic communications, it said.

It also said a system to regulate general telephone service has been developed for smooth telephone communications for rescue and restoration activities in an emergency.

The Japan Broadcasting Corporation (NHK) and other broadcasting stations have proceeded with disposition of mobile broadcasting installations and the police now have a nationwide shortwave communication network as well as their own communication circuits.

The Japan National Railways (JNR) also introduced a shortwave wireless circuit and has been going toward making the circuit microwave in line with electrification of railways, the report said.

The ministry is also developing an "urgent broadcast system" in which televisions and radios are automatically switched on to give people forecasts and warnings against emergency.

Private corporations are going on doubling computer circuits from the present single circuit and decentralizing date files against a computer accident.

The report also added mails totaled 15.7 billion letters in fiscal 1980, up 3.1 percent over the previous year, subscribed telephones about 39 million, up 3.4 percent, and subscribed television viewers 29.2 million, up 1.1 percent.

CSO: 4120/71

MDC/FOKKER EXECUTIVES ARRIVE IN COUNTRY

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 2-3

[Text]

Executives of McDonnell Douglas Corp. (MDC) and Fokker arrived in Japan in late October to brief Japanese aircraft industry representatives on details of the MDF-100 which they have proposed as Japan's Y-XX 150-seat-class transport aircraft for joint development.

The executives, including Vice President Jerald D. Burns of MDC's Douglas Aircraft Co. Division, were to meet with Yoshihiro Sakamoto, Chief of the Aircraft and Ordnance Division, Machinery and Information Industries Bureau, Ministry of International Trade and Industry, and officials of Civil Transport Development Corp., Mitsubishi Heavy Industries Ltd., Kawasaki Heavy Industries Ltd., Fuji Heavy Industries Ltd. and aircraft engine manufacturers.

The MDF-100 proposal was made when MDC Chairman Sanford N. McDonnell and Fokker Chairman Frans Swarttouw held talks with Japanese government and industry representatives concerned in Tokyo early last August. Since then, a special committee on the Y-XX of the Society of Japanese Aerospace Companies (SJAC), has been considering the proposal together with Boeing Co.'s 7-7 and Airbus Industrie's A320 proposals for the Y-XX to select a partner from the proposals for joint development of the new commercial transport.

To further look into the proposals, the SJAC special committee sent members of its working group to the United States for talks with Boeing and MDC/Fokker representatives in early October. Their meeting with MDC/Fokker representatives took place in Long Beach Oct. 6-7.

At follow-up talks with the Japanese in Tokyo, the MDC/Fokker executives were expected to touch upon a possible specific business arrangement for joint development of the MDF-100 with Japan and a survey on a possible world market for the new aircraft.

CSO: 4120/72

KHI NAMED CONTRACTOR FOR C-130H AIRFRAME OVERHAUL

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 3-4

[Text]

The Japanese Defense Agency (JDA) has named Kawasaki Heavy Industries Ltd. (KHI) as contractor to overhaul the airframe of the Lockheed C-130H tactical transport aircraft which the Air Self-Defense Force (ASDF) will acquire in FY 1983.

KHI had been competing with Shin Meiwa Industry Co. and Japan Aircraft Mfg. Co. (NIPPI) for the C-130H airframe overhaul contract. On the reasons for KHI's victory, informed sources said KHI had offered the lowest overhauling costs because it had readied sufficient overhaul equipment.

KHI has also undertaken maintenance of the C-1 jet transport for the ASDF.

The JDA has also named contractors for overhauling six other C-130H component parts. They are Ishikawajima-Harima Heavy Industries Co. for the Allison T-56-A-15 engine and the Bendix 6893609 gas turbine engine control system, Sumitomo Precision Products Co. for the Hamilton 54H60-117 propeller, Toshiba Corp. for the Litton LTN-72R inertial navigation system, and Tokyo Aircraft Instrument Co. for the Collins AP-105V auto pilot system and the Collins FD-109 flight director. Contractors for other parts will be selected in the future.

CSO: 4120/72

SCIENCE AND TECHNOLOGY

KHI LAUNCHES MT-X DEVELOPMENT

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 4-5

[Text]

Kawasaki Heavy Industries Ltd. (KHI) launched the development of the MT-X new intermediate trainer for the Air Self-Defense Force (ASDF) soon after a ¥1,590 million contract was concluded between the company and the Defense Agency's Central Procurement Office for a basic MT-X design in late October.

KHI was named prime contractor for the MT-X development and production program early last September. Mitsubishi Heavy Industries Ltd. (MHI) and Fuji Heavy Industries Ltd. (FHI) were appointed subcontractors to cooperate with KHI in the program.

The conclusion of the basic design contract was delayed somewhat because negotiations between KHI and the agency took more time than expected, due to KHI's original contract value estimate exceeding ¥1,596 million as earmarked in the FY 1981 budget. Actually, the contract value was about ¥8 million less than the budgeted amount. The contract calls for KHI to complete the basic design work by the end of October 1982.

The work on the MT-X basic design has been undertaken by an MT-X engineering team at KHI's Gifu Works in central Japan. It consists of 98 engineers -- 46 from KHI, 23 from MHI and 29 from FHI. KHI's Hirotaka Isozaki has been named chief engineer, and MHI's Tomoharu Shibata and FHI's Masaomi Kadoya the deputy chief engineers.

The team is divided into seven groups -- planning (eight engineers from KHI and two from FHI), cost control (two from KHI, one from MHI and two from FHI), aerodynamics (five from KHI, four from MHI and three from FHI), structure I (six from KHI, two from MHI and seven from FHI), structure II (four from KHI, six from MHI and five from FHI), equipment (six from KHI, five from MHI and four from FHI), and avionics (three from KHI, one from MHI and three from FHI). The number of team members will increase to about 120 at the peak of the work period in the next fiscal year.

KHI has also appointed Masahiko Iwata, Director and assistant general manager of Aircraft Manufacturing Division, as MT-X program manager. Toshio Hiraki, deputy director of the Aircraft Technology Department, and two others have been named assistant program managers. Furthermore, Sadaaki Fujisaki and three others have been named to form a support group for the engineering team.

The basic design work will be followed by detailed design work and fabrication of prototype aircraft. Overall MT-X development work is expected to be completed by FY 1987. The ASDF plans to procure about 200 of the new trainers replacing the T-33As and T-1As/Bs.

The ASDF's major MT-X requirements are maximum speed at 500 knots at sea level and Mach 0.9 at an appropriate training altitude, maximum climb rate at about 10,000 feet over the sea, maximum flight altitude at 40,000 feet, maximum flight range at 700 nautical miles, maximum landing speed at 90 knots, maximum takeoff distance at 2,700 feet, maximum landing distance at 2,500 feet and total weight of 5.5 tons.

CSO: 4120/72

JDA TO NEGOTIATE XF-3 CONTRACT WITH IHI

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 5-6

[Text]

The JDA will start negotiations with Ishikawajima-Harima Heavy Industries Co. (IHI) soon on a contract for fabrication of four final test prototypes of the XF-3-30 small turbofan engine designed for the ASDF's MT-X new intermediate trainer, since KHI has launched the MT-X development program.

The negotiations may center on the contract value. The XF-3-30's performance has been given a high rating. The only problem with adoption of the engine for the MT-X may be the price.

The contract, if successfully concluded, would virtually close the door to adoption of the SNECMA/Turbomeca Larzac, a rival of the XF-3-30, for the MT-X engine.

The JDA has already received five XF-3-30 development engines from IHI for tests to explore the possibility of the engine being installed for normal use on aircraft. The first engine was delivered in late October. The XF-3-30 is an improved version of the XF-3, which was developed with 700 hours of running tests since completion of the XF-3 first-phase engine in March 1976.

IHI plans further improvement for the four final test engines covered by the coming contract. Low cost material will be used with performance remaining high to reduce the engine's price close to an international level as requested by the JDA.

Average international price for such a small turbofan engine is estimated at ¥150 million per unit, according to Japanese industry sources. Although the Larzac, developed before the 1973 oil crisis, was originally quoted at around ¥110 million, the price is believed to have risen to the estimated international level.

IHI has done its utmost to reduce the XF-3-30's price despite rapid inflation following the oil crisis. But the ¥4,500 million previous XF-3-30 contract, setting the engine price at ¥900 million per unit, indicated that a production version of the XF-3 could be priced at ¥300 to 500 million without further cost reduction efforts.

The test engine for the coming contract will be priced lower than that for the previous one. The possible value of the new contract for the four test engines may be between ¥3,000 million and ¥3,500 million.

CSO: 4120/72

KOMATSU PICKED AS PRIME CONTRACTOR FOR 203MM HSP

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 6-7

[Text]

The JDA has picked Komatsu Ltd. as prime contractor for license production of the U.S. Army M110A2, 203mm self-propelled howitzer (HSP) for the Ground Self-Defense Force (GSDF). A formal contract will be signed by the end of March 1982.

Komatsu vied with Mitsubishi Heavy Industries Ltd. (MHI) for the prime contract. The JDA's selection of Komatsu resulted from its coordination of the two firms' shares in production of GSDF equipment. So far, contracts for production of tanks and other major GSDF fighting equipment have been awarded to MHI.

Komatsu as prime contractor will undertake production of the 203mm HSP chassis and assembly of the full system. The turret will be manufactured by Japan Steel Works Ltd. while the gun barrel and engine will be imported from the United States.

MHI and Hitachi Ltd. are expected to take part in Komatsu's manufacture of the chassis. MHI may take charge of the hydraulic system and Hitachi the power transmission.

The GSDF has been authorized to procure six of the 203mm HSPs for training purposes under the FY 1981 (April 1981-March 1982) budget. It has sought 12 units in the FY 1982 budget request.

CSO: 4120/72

TR&DI PLANS AIRBORNE XF-3-30 TESTS FOR JUNE 1982

Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 pp 8-9

[Text]

The JDA's Technical R&D Institute (TR&DI) plans airborne tests of the XF-3-30 small turbofan engine in June 1982 on a modified C-1 transport aircraft as a flying test bed, to be completed by KHI for delivery to the TR&DI in mid-January.

The XF-3-30 engine is now in development by IHI as a possible candidate for the engine of the MT-X new intermediate trainer for the ASDF. Its airborne tests will include reignition. The engine will also undergo ground fatigue tests and high-altitude performance tests using U.S. facilities.

The C-1 flying test bed is designed for flight tests of electronic aircraft components and missiles as well as engines. It will replace the C-46 which has so far tested the J-3 engine and electronic systems.

The aircraft will have a pylon to accommodate the engine or other components for airborne tests outside the airframe. It will also be equipped with racks for measuring instruments and test systems.

CSO: 4120/72

MITI, INDUSTRY HAGGLING OVER Y-XX PARTNER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 1-2

[Text]

The Ministry of International Trade and Industry (MITI) and the aircraft industry are haggling over the selection of a foreign partner for the industry's development of the Y-XX 150-seat-class commercial transport aircraft.

MITI wants to select the partner within this year, while the industry intends to avoid any hasty selection in consideration of uncertainties about the Y-XX project.

The ministry has earmarked ¥350 million in the FY 1981 (April 1981-March 1982) budget to subsidize the industry's work on a preliminary Y-XX design, planning to raise subsidies corresponding to about 50 percent of costs for the Y-XX development program as is the case with Japan's joint development of the Boeing 767 (Y-X) with the Boeing Co. and Italy. MITI has also sought ¥1,500 million of subsidies in its FY 1982 budget request for starting the industry's joint preliminary design work with a foreign partner in the next fiscal year. Therefore, MITI insists that the industry should select the foreign partner and exchange memoranda of understanding by the end of this year.

The industry had also intended to settle the selection within this year. But it has become cautious of hastening the matter, since it is the key factor for the success of the Y-XX project, estimated to cost more than ¥300,000 million. In case Japan takes a 20 percent share of the project, it would have to put up more than ¥60,000 million. Although half of the amount may be covered by government subsidies, the industry would have to shoulder about ¥50,000 million for investment in plant and equipment. This estimate has led the industry to exercise prudence in making a decision on the selection.

Candidates for the Y-XX partner are the Boeing Co., McDonnell Douglas Corp. and Fokker, and Airbus Industrie. The Japanese industry has promoted consideration of the three candidates' proposals for the Y-XX project. But an industry leader said Japan does not have to hasten the selection because these proposals have yet to take definite shape.

Three industry leaders -- Gakuji Moriya, consultant to Mitsubishi Heavy Industries Ltd., Zenji Umeda, Chairman of Kawasaki Heavy Industries Ltd., and Eiichi Ohara, Chairman of Fuji Heavy Industries Ltd. -- met early in November to discuss the matter. But they failed to make any decision on selection of the partner. Ohara said the industry had better start full-scale consideration of the foreign proposals after its executive mission visits the United States in mid-November.

Thus, the selection of the Y-XX partner could be delayed until the spring of 1982 or beyond. But this delay may affect the government's preparation of the FY 1982 budget. With those possible effects in mind, MITI would have to coordinate views with the industry. Attention will be focused on how the ministry will evaluate the industry's intention to delay the selection.

CSO: 4120/72

FLYING BOAT DEVELOPMENT TO COST 36.9 BILLION YEN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 p 2

[Text]

Japan's possible development of a flying boat is estimated to cost ¥36,900 million, according to a report prepared by the Society of Japanese Aerospace Companies (SJAC) on the basis of two years of research.

The flying boat has been recommended by the Machinery Industry Promotion Association and other research bodies as a new transport system.

The SJAC envisions the flying boat as a 30-to-50-seat amphibious plane which can take off from and land on an 800-meter onshore runway and a 1,000-meter offshore runway. The maximum wave height for the offshore runway is given as 1.5 meters. The maximum speed of the aircraft is planned at 300 to 350 knots, with a maximum flight range of 1,200 nautical miles.

The estimated development costs consist of ¥14,200 million for the airframe, ¥800 million for on-board equipment, ¥2,600 million for fatigue tests, ¥3,800 million for acquiring a type certificate, and ¥15,000 million for a shift to mass production.

The price of the flying boat is estimated at ¥2,130 million per plane for production of 100 planes, ¥1,240 million for 300 planes or ¥1,010 million for 500 planes.

Domestic sales of the flying boats are estimated to reach a level of 120 to 140 planes by FY 1990 and more than 200 planes by the year 2005.

CSO: 4120/72

MHI TO TAKE CARE OF YS-11 SUPPORT, SERVICING

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 p 3

[Text]

Mitsubishi Heavy Industries Ltd. (MHI) has tentatively decided to take the place of Nihon Aeroplane Manufacturing Co. (NAMCO) on product support and servicing of Japan's first post war passenger aircraft, the YS-11, on the condition that accumulated losses are wiped out before the takeover, MITI and industry sources said last week.

Approximately half the 120-man work force presently employed by NAMCO will be transferred to MHI, according to present planning. The remaining 60 employees will be absorbed by the Kawasaki and Fuji heavy industrial firms at rates of 35 and 15 percent respectively.

Production of the YS-11 stopped in 1973 after 180 turboprop aircraft were produced. NAMCO has continued to support and service YS-11 operators but MITI has decided to disband the government-funded company by the end of FY 1982 (March 1983) as part of its efforts to reduce government spending.

CSO: 4120/72

NEW AIR COMBAT MISSILE TO USE HIGH TECHNOLOGY

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 7-8

[Text]

The TR&DI plans to develop a highly advanced air-to-air missile which could be superior to the Raytheon AIM-9L and AIM-9M and even the ASRAAM (advanced short-range air-to-air missile) planned for development by the North Atlantic Treaty Organization (NATO).

The TR&DI is now going ahead with technical research on the new air combat missile, named XAAM-3, at the request of the Air Self-Defense Force (ASDF). Following fabrication of a double canard wing airframe from FY 1980 to 1981, it intends to manufacture the sensor and homing sections in FY 1982 and the guidance and control section and the gas servo mechanism in FY 1983.

The new missile is required to have off-boresight capability and a wider turning angle. The double canard wing airframe is expected to widen the turning angle, while the gas servo mechanism is planned to flexibly control the direction of a missile in flight.

CSO: 4120/72

NEW 155MM HSP TO BE DEVELOPED FOR GSDF

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 p 8

[Text]

The TR&DI will develop a new 155mm self-propelled howitzer (HSP) for the GSDF under FY 1983-87 MTDP as replacement for the existing Model 75 155mm HSP. The new HSP is expected to consist of the Model 75 155mm HSP chassis and the longer-range FH-70 gun mounted on the towed 155mm howitzer entering service in FY 1984.

The TR&DI tentatively plans to start fabrication of the new 155mm HSP in FY 1983, complete operational tests in FY 1985 and obtain a service entry certification in FY 1986. Originally, it had wanted to launch the new 155mm HSP development program in FY 1982.

The program's start could be delayed beyond FY 1983 depending on its coordination with other research and development projects for the GSDF in the fiscal year, including full-scale development of a mechanized infantry combat vehicle.

CSO: 4120/72

MELCO FABRICATES SATELLITE CONTROL SYSTEM

Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 pp 8-9

[Text]

Mitsubishi Electric Corp. (MELCO) and the Science and Technology Agency's National Aerospace Laboratory (NAL) have fabricated Japan's first prototype magnetic-bearing flywheel for three-axis attitude control of satellites, paving the way for their successful development of the new satellite attitude control system in several years.

Japan introduced a three-axis attitude control system from the United States for a test broadcast satellite launched in March 1978.

But the existing system, using ball bearings, consumes considerable electric power to spin the wheel, despite the frictional resistance of the bearings. Furthermore, its life is limited.

These problems can be overcome by the magnetic-bearing flywheel, in which the wheel is retained in air by magnets so that no frictional resistance is produced during the wheel's spin. Most of the industrialized countries are developing the new magnetic-bearing attitude control system.

The MELCO/NAL system is called the magnetic-bearing gimbal momentum wheel, consisting of a 28-centimeter-diameter wheel and a support stand. The wheel is retained in the air by two permanent magnets and an electromagnetic coil. Another electromagnet spins the wheel.

The spinning wheel can detect any inclination of the satellite. The satellite can recover a normal attitude in reaction to the wheel's gimbals.

The prototype's angular momentum is 3.5 Newton meters per second, far smaller than the 50 Newton meters per second for controlling a satellite. MELCO wants to fabricate a larger system for tests on a satellite as early as possible to set up domestic three-axis control technology.

Japan plans to launch the ETS III engineering test satellite in FY 1982, the BS II broadcasting satellite in FY 1983 and the MOS maritime observation satellite in FY 1986, all of which will use foreign three-axis control technology.

CSO: 4120/72

BRIEFS

Y-XX MARKET SURVEY IN U.S.--The Civil Transport Development Corp. (CTDC) will send three officials to the United States on Nov. 12 to study a possible U.S. market for 150-seat airliners in preparation for Japan's development of the Y-XX transport. Joined by another official in the United States, the three members of CTDC's Y-XX preparation office, including Shinji Kuse, will visit United Airlines, Delta Air Lines, American Airlines, Eastern Airlines and other U.S. carriers to discuss their technical requirements and procurement plans for 150-seat-class aircraft. The plans of United and Delta, in particular, are seen to be a key to Y-XX development. The CTDC has been given government subsidies under the FY 1981 budget to conduct a survey on the Y-XX development program. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English No 546, 11 Nov 81 p 3]

BUSINESS JET CERTIFICATED--Japan's first business jet MU-300 developed by Mitsubishi Heavy Industries Ltd. (MHI) has been certificated by the US Federal Aviation Administration (FAA). The orders and options placed for the aircraft by American and European operators have now reached 120. Delivery of the Mitsubishi MU-300 "Diamond One" will begin in January 1982. Powered by two P&W Canada turbofans, the aircraft has accommodations for 11 passengers. It has a range of 2,850 km and a maximim speed of 803 km/h. It flies faster than its competitor, the Cessna Citation II. The "Diamond One" will be marketed for approximately $2,600,000 per aircraft. MHI has sold 712 of the MU-2, a turboprop predecessor of the MU-300, throughout the world. [Text] [Tokyo JPE AVIATION REPORT-WEEKLY in English No 547, 18 Nov 81 p 3]

CSO: 4120/72

END

JPRS 79718

23 December 1981

Japan Report

No. 140

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 79718

23 December 1981

JAPAN REPORT

No. 140

CONTENTS

ECONOMIC

Tripartite Industrial Cooperation Between East, West
(Teruji Suzuki; DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) ... 1

SCIENCE AND TECHNOLOGY

Status of Offshore Oil, Gas Exploration, Development
(JAPAN PETROLEUM & ENERGY WEEKLY, 16, 23 Nov 81) 6

Final Work Under Way on Selection of Y-XX Partner
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 16

Matsushita Given Orders for B-767 Audio Systems
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 18

KHI Signs Memos With MHI, FHI on MT-X
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 19

Japan To Transfer Defense Technology to U.S.
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 20

JDA Orders Third AIS for F-15
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 21

ASDF May Launch FS-X Development in FY 83
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 22

ASDF Plans Development of New Radar in FY 1983-1987
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 23

Research, Development in Key Missile Parts To Be Promoted
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 24

Predevelopment Test Under Way for New Tank
(JPE AVIATION REPORT-WEEKLY, 25 Nov 81) 25

Future Course of Machine Tool Industry
(Yoshitaro Yoshida; DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 26

Current Trends of Machine Tool Industry
(Shinshichi Abe; DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981).. 32

Machine Tool Builders Comment on Industry
(DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 37

Market Trends of Machine Tool Industries
(DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 45

Trends in Metal Forming Machine Industry
(Hiroyasu Kagawa; DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 50

Key Products of Machine Tool Manufacturers
(DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 57

Current Trends of Machinery Industry
(Shigenari Tsuruoka; DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY, 1981) 93

TRIPARTITE INDUSTRIAL COOPERATION BETWEEN EAST, WEST

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981 pp 29-33

[Article by Teruji Suzuki, executive advisor, the Japan Association for Trade with the Soviet Union and Socialist Countries of Europe (SOTOBO)]

[Text]

General Trends of Tripartite of Industrial Cooperation

Ever since the beginning of East-West industrial cooperation, such activity has centered around large-scale plant exports from Western enterprises in a variety of fields. Rarely has this type of project involved third party countries in a tripartite relationship. The reason for this can be seen in both the belief that such activities are not economical and the fact that compared to the two major parties to such projects, there are many unknown and unpredictable areas concerning the capabilities of the third party country. Having to bear the risks entailed by these unknowns has created an unfavorable business climate for such relationships.

These tripartite relationships go beyond merely providing cooperation in the market of a third country (usually a developing country). They represent an inherent regional expansion of East-West economic cooperation.

If not viewed in this light, such tripartite projects would appear quite similar to the various multi-national projects presently being carried out by businesses of the advanced countries in developing countries, thus losing their uniqueness as tripartite projects. Normally, a tripartite cooperative project is said to be one in which a least three parties of differing nationalities and differing economic and technological levels join in international cooperation. While this type of project can be thought of as being a form of conventional international trade which centers around economic aid, the differing nature of third party markets in such East-West cooperative projects calls for new ideas and methodology in what could be thought of as a new international economic discipline. The new discipline has been accorded recognition to the degree that the term "tripartite industrial cooperation" has become an internationally recognized term, although a more accurate term in view of the East-West aspect of such projects would be "tripartite industrial cooperation between the East and the West."

Such East-West tripartite cooperation began in the form of bilateral relationships and entered a period of growth after the 1960s. Both economic and political factors were involved in this growth.

International trade and cooperation between the West and the East, wherein the Eastern nations possess only soft currencies, has continued in the form of peripheral economic activities outside of the framework of the *Bretton Woods System*. This is a distinct disadvantage, with Eastern countries forced to use either their small reserves of Western currencies or credit as a method of payment, resulting in a constant unfavorable trade balance for the Eastern nations. This problem of payments was forecast from the outset of this form of international trade.

While from an economic standpoint, the tripartite form of East-West cooperation has significance as a remedy for these problems, the political aspects must be considered as well.

Background of the Necessity

The fact that the countries of the East and the West sought partners for international cooperation outside of their own regions was a innovative international economic development and represents both an economic problem as well as an important political problem.

In a discussion of tripartite cooperation, the term third party country is used to indicate any of the many developing countries rather than a country outside of the region of the East and the West, as the term usually indicates. Unlike previous East-West cooperations, tripartite projects involving countries in this region require more than merely satisfying a set of economic conditions They call for the consideration of political efforts required to fill the existing cultural and development level gaps. This political effort should strive on a government-to-government basis to eliminate to some degree the unknown elements encountered in such cooperative efforts, providing a stable business environment. In general, this is implemented by the working out of framework agreements by the governments of two or more nations. If this is not done, information concerning such industrial cooperation is not available to individual enterprises, resulting in an information gap. In such a situation, individual companies could engage potential buyers without realizing that they are taking risks which they cannot afford.

The Socialist countries used economic aid as a part of their foreign policy after the end of the Second World War, based on their ideology which supports self-determination and freedom from colonialism. Today, however, they are making the decision to provide economic aid based on practical economic considerations as well as the political climate in the target nation. In general, economic aid is based on an agreement between two nations to determine the details of the economic, scientific, and cultural cooperation. In addition to these aspects, details of soft aid such as loans and free technological aid are determined.

While the foreign policy approach of the Socialist countries to developing nations after the War was clearly one of a "protector", the international situation of developing nations today has become more complex.

Aiming at national and economic independence, the developing nations are faced with the necessity to engage in a pluralistic foreign policy. They already have the recognition that the Socialists are not their only benefactors and this is the difficulty of clear-cut understanding current North-South problems.

Tripartite cooperation is the meeting ground of the East-West and North-South problems, two issues which are usually discussed separately, and this is one of the unique features of this form of international cooperation. It is a form of cooperation in which political considerations must accompany ecomonic considerations, so that governmental agreements become essential if this form of project is to succeed.

The term tripartite itself is imparted with a certain view of nations and their interrelations. If we consider the nations of the East and the West we see of course that both groups are in the group of Northern nations, and in contrast we can say that the third party partner would be referring to a nation in the Southern group, including nations in a very broad region encompassing Asia, Africa, and the Americas.

The selection of a trading partner in this region is not made on economic grounds alone. Since the nations of the East and the West have a stake in the nations of the South, cooperation with such nations as a third party partner must be based on a mutual agreement with coexistence as a prerequisite.

There is an added political significance to tripartite cooperation.

Since East-West tripartite cooperation develops mutually beneficial economic relationship, this must be accompanied by mutual political dependence. As long as there are political confrontations between the East and West, there is no reason for East-West industrial cooperation to develop.

The major gains that a third nation can make from tripartite cooperation is in funding and technology and it is nations which can gain in these areas that are prime candidates for such projects. This is the reason that the potential for such projects in North Africa and Asia is high.

Different Motives by Country

The countries which the Soviet Union and China select as partners in such economic aid projects are often chosen based on political considerations of those two nations.

On the other hand, the various forms of aid that former colonial or capital exporting nations such as United Kingdom and France and the U.S. have made available are designed to protect vested interests and their political presence in these countries. This is particularly true of the foreign policy with respect developing nations that evolved from what was the cold war.

However, as we entered the 1960s this two-dimensional confrontation of East and West over self-determination and anti-colonialism in the South became more complex, resulting in multilayered international relations with the North-South problem becoming more separated.

The first conference of UNCTAD (formed in 1964) which was attended by members from 77 nations of the South was a significant confrontation for both the West and the East nations who have taken in the past the position of protector of self-determination.

The multipolarization of the North-South problem resulted in a change in the general attitude of the Northern nations with respect to nations in the South. That is nations of both the East and the West came to modify their cold war type of foreign aid to give more consideration to geopolitical conditions as well as economic principles. Competition among the advanced nations for resources became particularly intense.

If the nations of the East and the West use geopolitical and economic conditions on which to base economic aid and cooperation, the area for coexistence and cooperation of the East and the West has potentially increased.

When we consider the complex conditions in developing nations, where constant local conflicts occur, we see both the possibilities and limitations of East-West cooperation in these nations.

The 1960s saw a split in the foreign policies of the Soviet Union and China. China began a more aggressive policy towards the developing countries of Africa.

However, in spite of the changes in China's policies towards the outside world, it is still geopolitically part of Asia in general and Southeast Asia in particular. People of Chinese origin have emmigrated to various countries of Southeast Asia, greatly influencing the economies of those countries. These overseas Chinese are an extremely significant factor in Asia.

Until 1970, China regarded the racial Chinese living outside of China's borders as part of the Chinese People, making an issue of this inside China as well as out. This must be thought of as an expression of the Chinese desire to place the overseas Chinese in Asia under the influence of the Chinese government.

This was a partial cause of the anti-Chinese violence that occured in Indonesia and Malaysia in the 1960s and a factor in the Chinese change in foreign policy with respect to Southeast Asia in the 1970s.

However, the economic power of the overseas Chinese remains as strong as ever. This overseas Chinese issue must, of course, be fully understood if East-West tripartite industrial cooperation is to work in Southeast Asia.

New Style International Cooperation

Thus tripartite industrial cooperation is a new, unknown form of international cooperation. It differs from the more conventional and easier to manage forms of trade, in that the parties involved in the relationships must, basically through their own efforts, strive to gain an understanding of the unknowns.

However, if basic trade-related conditions are not met, this form of cooperation tends not to succeed.

This is of course true for the case of Japan and other examples can be found easily in the nations surrounding Japan. The reason for this is clearly an information gap which does not allow risks to be predicted, resulting in the parties concerned making decisions based on conventional trade considerations.

The former colonial countries of Great Britain and France have developed uniquely friendly relationship to support their dealings with former colonial states. In answer to this, nations of the East have formed a number of friendly relations to formalize arrangements of economic aid with various developing nations. Cooperation agreements with third nations are often thus included not only economic aid but also scientific and cultural cooperations.

In addition, recent agreements between East and West powers have included agreements on the promotion of industrial cooperation with developing nations. This usually does not take the form of specific details but is left in terms of general principles, the internal laws of the individual nations bearing great importance.

In the case of the Socialist nations in particular, the position of international law dominant over domestic law is recognized as a principle of legal order, internal laws will give special consideration to such industrial cooperation stipulated by agreements.

In addition, although it is only a general rule, if grounds for mutual benefit are decided by government agreements, they form the basis of settlements of conflicts, should they arise. Thus, agreement between governments is an important part of tripartite industrial cooperation.

Future Direction of the Project

An East-West tripartite industrial cooperation project must deal with not only differing systems in the East and the West but also be able to cope with the cultural and economic development level differences encountered in the third country. From the standpoint of safety compared with conventional international trade, the number of governing factors multiplies.

One such area concerns differing cultures, where both the East and the West partners in the relationship have a European cultural background and the third party is a nation in a multi-cultural region. In these cases, it is extremely important to the success of the entire project that these many factors can be accommodated from within the enterprise itself.

While it is easy for a French company to provide industrial cooperation to a former French controlled nation, the same company would encounter difficulties in dealing with a former British holding. One wonders whether the Soviet Union or the Eastern European nations who have traditionally had little contact with the nations of Southeast Asia could understand and cope with the cultural differences in this area as well as such issues as that of overseas Chinese.

Tripartite industrial cooperation involving China, Africa or the Islamic nations must be able to deal with the overwhelming cultural problems posed by language, working customs, business practices and differing social value systems.

Thus, while tripartite industrial cooperation, a new discipline born of international economic dynamics, represents a mutually beneficial relationship which is presumably built upon rational considerations, the actual implementation of such relationships must work also in harmony with the non-economic elements of social and cultural target, lest the relationship be subject to a form of "cultural risk", which could be termed the cost of culture.

Historically, when directly faced with such multifaceted cultures, for example, the Jews and Armenians in Europe and overseas Chinese in Asia especially, have handled the problem by specializing in transnational trade. While at present it is thought to be quite easy to deal with these problems for a nation possessing many national or racial groups, this cultural cost might multiply for a homogenious society such as Japan.

For conventional forms of trade, Japan developed a unique system of general trading companies as a means of conducting international trade. This, I believe, reflects fundamental economic and cultural isolation of Japan.

When dealing with third countries in industrial cooperation projects however, the level of contact with differing cultures increases greatly. There are cases in which the number of related companies in the target country reaches several hundred, and in which the number of international team members reaches several hundred to ten thousand. This, I feel, makes the cultural cost in such a project an important consideration. Whether this is to be considered as only a cost or a problem to be handled by the third country partners depends on the nature of the tripartite project.

How to Narrow the Gap

The East-West technocracy gap can be considered to be the result of East-West economic cooperation over the past 20 years. The Soviet Union, with the exception of its great military power, is behind the West, especially in the area of consumer technology. Technology transfer between the East and the West in general focussed on technology transfer from West to East. At times, this rapid transfer met strong opposition on both purely strategic grounds and as a part of a policy of economic watchfulness.

In spite of this transfer, the gap between the East and the West clearly continues to exist, particulary in consumer technology. The West had simply continued with more advanced technological developments while transferring relatively older technology to the East.

Therefore, as long as the mutual dependency exists between the East and the West, the East will remain in its position of an importer of technology from the West. In spite of the East's opening up of trade with the West, the past 20 years have continued to show a clear unfavorable trade balance.

While it is natural for the nations of the East to wish to export the fruits of their industrialization to world markets, in the present situation between the East and the West this desire is met with limited satisfaction.

If countries of the East and the West with clearly differing levels of technology can cooperate each in its own field, mutual benefit can be achieved. Tripartite industrial cooperation is the ideal vehicle for such a relationship.

This can be important on grounds of political benefit as well. That is, even if there is a limit to East-West economic cooperation, such cooperation can be achieved in spite of differing systems, the fundamental basis for the cold war itself. By virtue of continuing peaceful coexistence and detente, the limitations have clearly been lessened; particularly at the end of the 1970s. However, there is at times the possibility of change, as seen in the U.S. economic sanctions taken with regard to the Afganistan incident.

The North-South problem is one that the East and the West recognize as the same. In providing economic cooperation to the third countries of the South, I feel the maximum effort must be made to eliminate elements of East-West confrontation. That is, such cooperation should serve as a factor to maintain political peace. ■

CSO: 4120/74

SCIENCE AND TECHNOLOGY

STATUS OF OFFSHORE OIL, GAS EXPLORATION, DEVELOPMENT

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16, Nos 46-47, 16, 23 Nov 81
pp 10-18

[Text]

(This is the fifth in a series on Japanese oil exploration and development. - Editor)

Japan's offshore oil and gas exploration in 1981 witnessed the drilling of seven wells, including two wells presently under way. This is far below the target of 15 exploratory wells originally set in the Fifth Five-Year Plan for Domestic Oil & Gas Development formulated and published on July 26, 1979 by the Ministry of International Trade and Industry (MITI) (JPEW, July 30, 1979).

The distribution of these seven wells and the companies engaged in exploration activities are summarized below:

- Two wells have been drilled and one well is being drilled in the Japan Sea off Niigata Prefecture by New Japan Sea Exploration Co., a subsidiary of Idemitsu Kosan, and Amoco Japan Exploration Co. on a 50:50 basis. One of the two wells completed was sunk off Naoetsu under MITI's Five-Year Plan for carrying out stratigraphic drilling and hence was totally subsidized by the government, with New Japan Sea Exploration as the operator under a consignment contract with MITI. One well drilled off Aga North was successful, testing 4,000 b/d of oil production. An appraisal well is now being drilled in this field and two more appraisal wells are planned by March 1982. Details of the three wells are shown below:

  Off Aga North 1A-3 Well

  . Location: 38°06'50"N
  139°09'25"E

  . Drilling period: Spudded March 23, 1981; Ended April 23, 1981; Rig released June 8, 1981

  . Well depth: 2,200 meters (7,216 ft)
  . Water depth: 85 meters (279 ft)
  . Rig used: Hakuryu No.2, Japan Drilling Co.
  . Results: Successful

Off Naoetsu North Well

- Location: 37°23'28"N
  138°10'46"E
- Drilling period: Spudded June 23, 1981; Ended September 16, 1981; Rig released September 26, 1981
- Well depth: 4,509 meters (14,790 ft)
- Water depth: 212 meters (695 ft)
- Rig used: Hakuryu No.5, Japan Drilling Co.
- Results: Dry

Off Aga North 1A-4 Well

- Location: 38°07'11"N
  139°10'12"E
- Drilling: Spudded October 29, 1981, and is presently being drilled
- Well depth (target): 1,700 meters (5,576 ft)
- Water depth: 93 meters (305 ft)
- Rig being used: Hakuryu No.2

- One well was completed early in 1981 off Tomakomai, Hokkaido by Japex Hokkai Co., a subsidiary of Japan Petroleum Exploration Co. (Japex). This was the eighth exploratory well drilled in this area by the company, with one of them (Yufutsu B-2 well) confirming that the Yufutsu "B" structure has promising potential gas deposits. Details of the well are shown below:

Off Yufutsu B-4 Well

- Location: 42°27'55"N
  141°46'09"E
- Drilling period: Spudded November 11, 1980; Ended January 19, 1981; Rig released February 26, 1981
- Well depth: 3,583 meters (11,752 ft)
- Water depth: 51 meters (167 ft)
- Rig used: Hakuryu No.2
- Results: Dry

- One well was completed around mid-1981 off Kashiwazaki, Niigata Prefecture by North Japan Continental Shelf Oil Co., a subsidiary of Teikoku Oil Co., as shown below:

Off Kita-Yoneyama-1 Well

. Location: 37°20'45"N
138°25'49"E

. Drilling period: Spudded May 8, 1981; Ended June 13, 1981; Rig released June 19, 1981

. Well depth: 2,705 meters (8,872 ft)
. Water depth: 39 meters (128 ft)
. Rig used: Hakuryu No.5
. Results: Dry

- Stratigraphic drilling of one well has been completed early in 1981 off Miyako Island, Okinawa, under MITI's Five-Year Plan, with Teikoku Oil Co. as the operator.

Stratigraphic Drilling

. Location: 24°46'20"N
125°41'50"E

. Drilling period: Spudded December 21, 1980; Ended February 20, 1981; Rig released March 6, 1981

. Well depth: 3,711 meters (12,172 ft)
. Water depth: 286 meters (938 ft)
. Rig used: Hakuryu No.5

- One well is now being drilled in the subzone No.7 of the East China Sea continental shelf between Japan and ROK under the joint Japan-ROK oil and gas development agreement, with Hamilton Brothers as the exploration operator (and with Nippon Oil Exploration Co. as the exploitation operator), as shown below:

JDZ VII-2 Well (joint development subzone No.7)

. Location: 30°23'12"N
126°27'33"E

. Drilling: Spudded October 5, 1981, and is presently being drilled

. Well depth (target): 4,200 meters (13,780 ft)
. Water depth: 80 meters (262 ft)
. Rig being used: Hakuryu No.5

MITI launched its Fifth Five-Year Plan in April 1980 for exploration and development of oil and gas resources on the Japanese continental shelf and slope, with the government playing a leading role in extending financial assistance. Under the five-year plan, a total of 75 exploratory wells will be drilled during the fiscal 1980-1984 period with an estimated total expenditure of ¥160,360 million ($700 million) — with the government spending ¥29,770 million ($129 million) for reconnaissance surveys and stratigraphic drilling and the private sector spending ¥130,590 million ($568 million), which includes financial aid from the governmental Japan National Oil Corp. totaling ¥96,780 million ($421 million), for geophysical exploration and exploratory drilling. As a result of these stepped-up exploration activities, it is expected that Japan's offshore oil and gas production will reach 5.7 million kl (nearly 100 thousand barrels per day) in oil equivalent by 1985.

In addition to the above offshore activities, the five-year plan also envisages drilling of 50 onshore exploratory wells and capital expenditures totaling ¥36,540 million ($160 million), including ¥18,340 million ($80 million) of government funds, with oil and gas production expected to reach 2.3 million kl (40 thousand barrels per day) in oil equivalent by 1985.

Japan's continental shelf (with water depths up to 200 meters; 656 ft) is believed to have a sedimentary basin covering an area of about 150,000 sq km (37 million acres), while the continental slope (with water depths of 100-2,000 meters) is believed to have a sedimentary basin covering about 220,000 sq km (54 million acres). According to the latest revised estimates published in July 1979 by the Development Committee of the Petroleum Council, an advisory body to the Minister of MITI, the Japanese continental shelf/slope, at water depths of 500 meters (1,640 ft) or less, is estimated to have recoverable oil and gas reserves totaling 1.3 billion kl (8.2 billion barrels) in oil equivalent.

Japan's offshore exploration activities date back to 1958, when Japex started drilling offshore wells in the Japan Sea off Tsuchizaki, Akita Prefecture, using the rig "Hakuryu No.1" which is operable in water depths of 33 meters (108 ft) or less. By 1968, a total of 42 wells had been drilled off Akita and Niigata Prefectures, with a combined depth drilled totaling 77,997.7 meters (255,832 ft).

However, full-fledged offshore exploration was started in 1971, when Japex Offshore and Idemitsu/Amoco jointly began drilling exploratory wells off Akita, using the rig "Hakuryu No.2" (operable in water depths up to 200 meters), while Nishi Nihon Sekiyu Kaihatsu (a 50:50 joint venture of Shell and Mitsubishi-group companies which was later reorganized into the present Shin Nishi Nihon Sekiyu Kaihatsu) began exploratory operations off Shimane Prefecture, using the rig Ocean Prospector.

Shown below are the number of exploratory wells sunk on the Japanese continental shelf on a year-by-year basis. A total of 123 wells will have been drilled by the end of 1981, including two wells presently being drilled:

Calendar Year	Annual	Cumulative
Up to 1968	-	42
1969 & 1970	-	42
1971	4	46
1972	10	56
1973	11	67
1974	11	78
1975	4	82
1976	2	84
1977	8	92
1978	10	102
1979	6	108
1980	8	116
1981	7	123

Cumulative offshore exploration expenses during the period from fiscal 1971 through 1980 totaled ¥110,828 million ($482 million), while offshore development expenditures during the same period totaled ¥20,895 million ($91 million).

Japan's first substantial offshore oil and gas production began in September 1976 in the Aga Field, off Niigata, which had been jointly developed by Japex Offshore and Idemitsu/Amoco. The Aga Field's oil and gas production in fiscal 1980 averaged 1,140 b/d and 38.7 MMscfd, respectively.

As reported previously (JPEW, October 26 - p.10), preparations are now under way jointly by Teikoku Oil, Esso Sekiyu Kaihatsu and East Japan Oil Development, a Toa Nenryo Kogyo subsidiary, for commercial production of natural gas to begin in early 1984 at the Iwaki Field, in the Pacific Ocean off Fukushima Prefecture. The first gas field to be discovered on the Pacific side of the Japanese continental shelf, the Iwaki Gasfield is estimated to have total recoverable reserves of 3.5-5.5 billion cubic meters (120-190 billion cu ft). On May 19, the three companies signed an agreement with Tokyo Electric Power Co. to supply 1.2 million cubic meters per day (42 MMscfd) of gas and 40 kl/day (250 b/d) of condensate, over a 10-year period starting in February 1984, to a thermal power plant now under construction at Hirono, Fukushima Prefecture.

Shown below is Japan's domestic oil and gas production on a year-by-year basis during the past twelve years:

Crude oil/natural gas liquids production, 1,000 kl

	Onshore*				Offshore	
Fiscal Year	Japex	Teikoku Oil	Others	Subtotal	Japex Offshore/ Idemitsu/Amoco	Total
1969	335	478	75	888	-	888
1970	381	452	68	901	-	901
1971	392	413	62	867	-	867
1972	410	361	60	831	-	831
1973	408	348	62	818	-	818
1974	401	302	53	756	-	756
1975	366	277	56	699	-	699
1976	343	223	52	618	72	690
1977	301	205	44	550	122	672
1978	278	171	45	494	115	609
1979	264	155	41	460	91	551
1980	242	115	58	415	66	481
Cumulative	4,121	3,500	676	8,297	466	8,763

(*) Includes a small offshore production from 42 wells drilled in shallow waters during the fiscal 1958-1970 period.

Natural gas production, million cubic meters

	Onshore				Offshore	
Fiscal Year	Japex	Teikoku Oil	Others	Subtotal	Japex Offshore/ Idemitsu/Amoco	Total
1969	419	618	1,221	2,258	-	2,258
1970	509	639	1,240	2,388	-	2,388
1971	548	680	1,211	2,439	-	2,439
1972	613	748	1,151	2,512	-	2,512
1973	697	815	1,104	2,616	-	2,616
1974	732	743	1,031	2,506	-	2,506
1975	751	710	985	2,446	-	2,446
1976	713	630	972	2,315	289	2,604
1977	693	586	879	2,158	617	2,775
1978	636	477	914	2,027	556	2,583
1979	600	411	861	1,872	479	2,351
1980	588	380	784	1,752	399	2,151
Cumulative	7,499	7,437	12,353	27,289	2,340	29,629

(Source: Petroleum Producers Association of Japan)

Japex Offshore, Ltd./Idemitsu Oil Development Co./Amoco Japan Exploration Co.

Japan's full-fledged offshore oil and gas exploration and development activities started in July 1968, when a basic agreement was signed between Japan Petroleum Exploration Co. (Japex) and Idemitsu Kosan Co. to jointly undertake the exploration and development in the Japan Sea off Akita, Yamagata and Niigata Prefectures.

Consequently, the two companies established their respective subsidiaries — Japex Offshore, Ltd. (formed on May 20, 1971) and Idemitsu Exploration Co. (Japan Sea) (formed on January 26, 1971, and was renamed Idemitsu Oil Development Co., effective July 14, 1976) to promote the joint exploration/development project. Later, on June 7, 1971, Amoco Japan Exploration farmed in Idemitsu to acquire a 50% of Idemitsu's share in the project. Thus, the joint operation is now being carried out by Japex Offshore, Idemitsu Oil Development and Amoco on a 50:25:25 basis, with Japex Offshore as the operator.

On March 2, 1979, Idemitsu Oil Development established its subsidiary, Oga Oil Exploration Co., to promote exploration in an area off Kotokawa, Oga Peninsula, with Japex Offshore on a 50:50 basis. On March 3, 1980, Idemitsu Oil Development established its subsidiary, Niigata Oil Development Co., to promote exploration in an area off the mouth of the Shinano River, with Japex Offshore, Niigata Oil and Amoco sharing the working interest on a 50:25:25 basis.

A total of 16 exploratory wells were drilled under the joint operation program during the period from June 1971 through July 1980, as shown below. Oil and gas discovery was made in the Aga Field, which started commercial production on September 27, 1976, at the initial rate of 350 kl per day (2,200 b/d) of oil and 1.75 million cubic meters per day (62 MMscfd) of gas.

Company	Location	Drilling	Rig Released	Total Depth		Results	Rig Used
		Spudded/Ended		Meters	Feet		
Japex Offshore/Idemitsu Oil Development/Amoco (50:25:25)							
. Off Yuri North SI#1	139°56'15"E 39°40'44"N	June 14, 1971 Aug.31, 1971	Sept.6, 1971	4,015	13,169	Dry	Hakuryu #2
. Off Akita North SI#1	139°59'52"E 39°41'30"N	Sept.12, 1971 Oct.19, 1971	Oct.30, 1971	3,003	9,850	Dry	Hakuryu #2
. Off Aga SI#1a	139°07'24"E 38°02'18"N	Dec.10, 1971 Jan.22, 1972	Mar.2, 1972	3,505	11,496	Successful	Hakuryu #2
. Off Aga SI#2	139°08'22"E 38°03'34"N	Mar.5, 1972 June 25, 1972	July 21, 1972	4,574	15,003	Successful	Hakuryu #2
. Off Aga SI#3	139°05'57"E 38°02'57"N	July 23, 1972 Aug.20, 1972	Sept.9, 1972	3,511	11,516	Successful	Hakuryu #2
. Off Aga SI#4	139°06'53"E 38°02'21"N	Sept.11, 1972 Sept.24, 1972	Oct.8, 1972	2,400	7,872	Successful	Hakuryu #2
. Off Aga SI#6	139°06'07"E 38°04'01"N	Nov.15, 1972 Dec.8, 1972	Jan.8, 1973	2,400	7,872	Successful	Hakuryu #2
. Off Aga SI#5a	139°04'48"E 38°02'26"N	Jan.10, 1973 Feb.21, 1973	Mar.8, 1973	3,445	11,300	Successful	Hakuryu #2
. Off Yuri Central SI#1	139°56'27"E 39°36'32"N	Mar.15, 1973 Apr.11, 1973	May 3, 1973	2,771	9,089	Dry	Hakuryu #2
. Off Noshirc SI#1	139°49'13"E 40°09'02"N	May 6, 1973 June 7, 1973	June 14, 1973	2,360	7,741	Dry	Hakuryu #2

- Continued on next page -

Company	Location	Drilling Spudded/Ended	Rig Released	Total Depth Meters	 Feet	Results	Rig Used
Japex Offshore/Idemitsu Oil Development/Amoco (50:25:25) (cont'd)							
. Off Shonai SI#1	139°48'32"E 39°06'58"N	Mar.28, 1974 Apr.17, 1974	Apr.30, 1974	2,004	6,573	Dry	Hakuryu #2
. Off Aga SI#7	139°07'25"E 38°05'33"N	May 5, 1974 May 19, 1974	June 2, 1974	2,300	7,544	Dry	Hakuryu #2
. Off Asanai SI#1	139°56'00"E 40°08'21"N	Sept.1, 1977 Sept.19, 1977	Sept.22, 1977	2,007	6,583	Dry	Hakuryu #4
. Off Kamaya SI#1	139°57'07"E 40°07'22"N	Sept.24, 1977 Oct.10, 1977	Oct.24, 1977	2,306	7,564	Dry	Hakuryu #4
Japex Offshore/Oga Oil Exploration (50:50)							
. Off Kotokawa SI#1	139°50'37"E 40°01'00"N	Feb.28, 1979 Mar.30, 1979	Apr.5, 1979	2,300	7,544	Dry	Hakuryu #4
Japex Offshore/Niigata Oil Development/Amoco (50:25:25)							
. Off Shinano River SI#1	139°02'55"E 38°00'53"N	Mar.30, 1980 July 27, 1980	Oct.6, 1980	5,315	17,433	Dry	Hakuryu #5

Japex Offshore, Ltd.

As referred to above, the company was established on May 20, 1971, as a subsidiary of Japan Petroleum Exploration Co. (Japex), to undertake the exploration and development off Akita, Yamagata and Niigata Prefectures, jointly with Idemitsu Oil Development and Amoco Japan Exploration, with Japex Offshore holding a 50% working interest in the joint project.

In addition to the operation outlined above, Japex Offshore presently holds equity shares in other Japanese exploration and development companies listed below:

(A) = Paid-up capitalization of companies, as of July 1, 1981, ¥million

(B) = Japex Offshore's capital investment in companies, as of July 1, 1981, ¥million

(C) = % Share of equity capital held by Japex Offshore, as of July 1, 1981

	(A)	(B)	(C)
Japex Sumatra Co., Ltd.	3,175	160	5.0
Japex Rantau Ltd.	684	37	5.5
Japan Oil Sands Co., Ltd.	3,641	60	1.6

Japex Offshore, Ltd. is now capitalized at ¥5,963 million ($25.9 million). Listed below are 15 shareholders of the company as of July 1, 1981:

	¥ Million	% Share
Japan National Oil Corp.	2,767.00	46.4
Japan Petroleum Exploration Co.	2,141.32	35.9
Mitsui & Co.	159.80	2.7

- Continued on next page -

	¥Million	%Share
Toyo Oil Development Corp.	159.80	2.7
Mitsubishi Gas Chemical Co.	111.86	1.9
Tohoku Electric Power Co.	111.86	1.9
Mitsubishi Petroleum Development Co.	92.3	1.6
Marubeni Corp.	91.3145	1.5
Sumitomo Corp.	79.9	1.3
Sumitomo Metal Industries, Ltd.	79.9	1.3
Nippon Yusen K.K.	68.4855	1.1
Teikoku Oil Co.	31.96	0.5
Mitsubishi Corp.	22.50	0.4
Mitsubishi Mining & Cement Co.	22.50	0.4
Mitsubishi Heavy Industries, Ltd.	22.50	0.4
	5,963.00	100.0

Idemitsu Oil Development Co.

The company was originally established on January 26, 1971, as Idemitsu Exploration Co. (Japan Sea) Ltd., a subsidiary of Idemitsu Kosan Co., to promote the exploration and development in a Japex-held area in the Japan Sea off Akita, Yamagata and Niigata Prefectures, jointly with Japex Offshore, Ltd. and Amoco Japan Exploration, with Idemitsu and Amoco holding a 25% working interest each in the joint project.

The company was renamed Idemitsu Oil Development Co. under the reorganization of the Idemitsu group of companies announced on July 14, 1976, so that Idemitsu Oil Development, as an oil exploration/development arm of Idemitsu Kosan, supervises all of Idemitsu group's oil exploration and development operations both at home and abroad, while carrying out the joint production of the Aga Field, off Niigata Prefecture, and further joint exploration with Japex Offshore, Ltd. as outlined above. The company is now capitalized at ¥6,466 million and is wholly owned by Idemitsu Kosan Co.

Idemitsu Oil Development Co's exploration activities in overseas areas are outlined below:

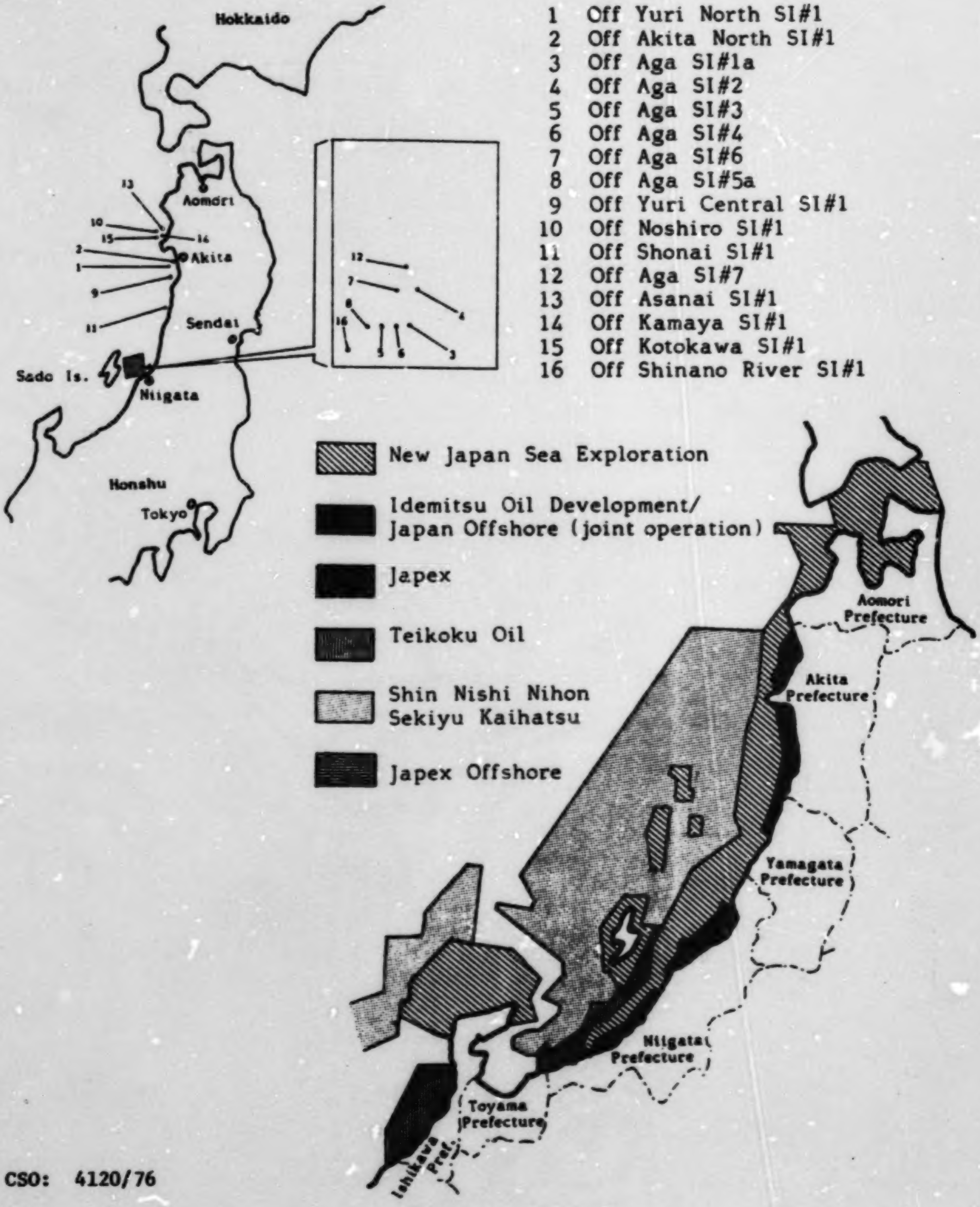
In August 1979, Idemitsu Oil participated in an offshore exploration program in the Gulf of Tongking in southern China, where 30 companies jointly conducted exploration of an area (26,600 sq km; 10,270 sq mi), with Amoco as the operator. In May 1980, Idemitsu Oil participated in an onshore exploration program in western Kalimantan, where eight companies are jointly conducting exploration, with Pertamina as the operator. Idemitsu South America Oil Exploration Co. was established in January 1981 as Idemitsu Oil's subsidiary, to promote exploration in Brazil, jointly with Elf, AGIP, and BP.

Idemitsu Oil Development Co's equity interests in its subsidiaries as of July 1, 1981, were as follows: a 59.9% interest in New Japan Sea Exploration Co. capitalized at ¥11,790 million; a 53% interest in Niigata Oil Development Co. capitalized at ¥660 million; a 53% interest in Oga Oil Exploration Co. capitalized at ¥180 million; a 79.1% interest in Idemitsu South America Oil Exploration Co. capitalized at ¥215 million.

- Continued next week -

EXPLORATION IN THE JAPAN SEA

(Japex Offshore/Idemitsu/Amoco Joint Operation)


Hokkaido
Aomori
Akita
Sendai
Sado Is.
Niigata
Honshu
Tokyo
13
10
15
14
2
1
9
11
12
7
4
8
16
5
6
3
New Japan Sea Exploration
Idemitsu Oil Development/ Japan Offshore (joint operation)
Japex
Teikoku Oil
Shin Nishi Nihon Sekiyu Kaihatsu
Japex Offshore
Aomori Prefecture
Akita Prefecture
Yamagata Prefecture
Niigata Prefecture
Toyama Prefecture
Ishikawa Pref.

1 Off Yuri North SI#1
2 Off Akita North SI#1
3 Off Aga SI#1a
4 Off Aga SI#2
5 Off Aga SI#3
6 Off Aga SI#4
7 Off Aga SI#6
8 Off Aga SI#5a
9 Off Yuri Central SI#1
10 Off Noshiro SI#1
11 Off Shonai SI#1
12 Off Aga SI#7
13 Off Asanai SI#1
14 Off Kamaya SI#1
15 Off Kotokawa SI#1
16 Off Shinano River SI#1

CSO: 4120/76

SCIENCE AND TECHNOLOGY

FINAL WORK UNDER WAY ON SELECTION OF Y-XX PARTNER

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 3-4

[Text]

The Japanese aircraft industry is going ahead with the final work on selection of a foreign partner in the development of the Y-XX 150-seat commercial transport aircraft.

Managing directors of three major airframe manufacturers--Mitsubishi Heavy Industries Ltd., Kawasaki Heavy Industries Ltd. and Fuji Heavy Industries Ltd.--left for the United States in mid-November to consult with leaders of the Boeing Co. and McDonnell Douglas Corp./Fokker group on details of their proposals for the Y-XX. At the same time, the Civil Transport Development Corp. sent a working-level mission to the USA to investigate future demand for 150-seat transport aircraft with visits to United Air Lines and Delta Air Lines, promising purchasers of such aircraft.

The consultations with candidates for the Y-XX partnership and the market survey will serve as the basis for the industry's decision on the selection expected by the end of this year.

Under the present circumstances, the industry is likely to select Boeing as the partner, provided that its terms for joint aircraft development with Japan turn out to be the same as those of the McDonnell Douglas/Fokker group and Airbus Industrie, another candidate, sources say. This is because the Japanese industry has been proceeding with the joint development and production of the Boeing 767 (Y-X) with the U.S. aerospace giant. Boeing has proposed the 7-7 as the Y-XX for joint development with Japan. But doubts are left about sharing of profits and other terms for the joint venture.

The three Japanese firms' managing directors were to confer with President R.W. Welch and Vice President J.F. Sutter of Boeing Commercial Airplane Co. on these questionable points. They will propose that Japan take part in all development, production and sales phases for the new aircraft with the participation ratio at 20 percent. Another task is to confirm whether Boeing will really go ahead with the 7-7 project.

The McDonnell Douglas/Fokker group's terms for the development of the MDF-100 as the Y-XX are said to be more favorable to the Japanese than the Boeing-proposed terms. The Japanese representatives are to confirm the overall picture for the MDF-100 project by talks with McDonnell Douglas Chairman James S. McDonnell and Fokker Chairman F. Swarttouw.

Airbus Industrie has proposed the A320-100/200 as Japan's Y-XX. The European consortium announced at the last Paris Air Show that it had already launched the development of the aircraft after receiving orders for 50 aircraft from Air France.

Prior to the final decision on the partner selection, the Japanese industry will consult with the Ministry of International Trade and Industry (MITI), which is to raise subsidies for the Y-XX project. The consultation will focus on what sections of the new aircraft Japan should develop and produce in the international program. The industry is inclined to choose the fuselage sections as it did with the Boeing 767 program, while MITI wants it to develop the main wing to expand its aircraft production capacity. MITI has sought ¥1,502 million for Y-XX project subsidies in its FY 1982 budget request.

Meanwhile, the industry briefed the ruling Liberal-Democratic Party on the Y-XX project on Nov. 10 to seek LDP support for the MITI-requested subsidies.

In this briefing, the industry said it intends to achieve great progress through the Y-XX program, which will be the last big commercial transport development program in the 20th century. It noted the aircraft will be a combination of sophisticated technologies, including composite materials and electronic controls, to feature fuel efficiency.

The industry also pointed out that any commercial aircarft development project demands much time and funding, and thus involves great risks. Since the Y-XX project is to coincide with the Japan-Boeing-Italy Boeing 767 (Y-X) production and the Japan/Rolls-Royce RJ500 (XJB) engine development programs, the Japanese aircraft industry would have to put up more than ¥350,000 million at peak phase, it said. Noting that aircraft development programs are supported by government subsidies in both Europe and the United States, MITI said it hopes that the LDP will give due consideration to government subsidies for the Y-XX program.

CSC: 4120/77

MATSUSHITA GIVEN ORDERS FOR B-767 AUDIO SYSTEMS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 p 5

[Text]

Matsushita Electric Industrial Co. has been awarded Boeing Co. orders for the MUX audio entertainment systems for the 300 Boeing 767s which the U.S. aerospace giant has begun to produce with Italian and Japanese aircraft manufacturers.

This is the first foreign order for the Matsushita MUX system, which is 30 percent lighter than other audio systems for commercial transport aircraft because of increased use of semiconductor chips. The system produces few malfunctions.

Boeing gave a high rating to the Matsushita system, and designated it for B-767s in February 1980. Matsushita delivered sample systems to Boeing in late 1980.

The systems are estimated to cost ¥50 to 60 million per aircraft. Matsushita has already started deliveries. But it will take several years to complete delivery of all the systems on order.

CSO: 4120/77

KHI SIGNS MEMOS WITH MHI, FHI ON MT-X

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 5-6

[Text]

Kawasaki Heavy Industries Ltd. (KHI), the prime contractor for development and production of the MT-X intermediate trainer for the Air Self-Defense Force (ASDF), has signed memorandums on the program with Mitsubishi Heavy Industries Ltd. (MHI) and Fuji Heavy Industries Ltd. (FHI) as subcontractors, confirming that priority will be given to their fixed contribution ratios, rather than to respective aircraft sections, for their manufacturing shares of the MT-X program.

The momorandums also provided that each subcontractor will be responsible for supplying and installing extra-airframe components for their respective sections. The contribution ratios will correspond to average labor expenditures for mass production, they said. The MT-X development program was started in late October with work on the basic design.

The fixed contribution ratios are about 38 percent for KHI as prime contractor, about 32 percent for MHI, and about 30 percent for FHI. KHI is expected to undertake fabrication of the front fuselage section and the horizontal tail, assembly of a full aircraft and flight tests. The sections for MHI to handle may be the middle and rear fuselage sections, the air inlet and the vertical tail. Those for FHI may be the main wing, the canopy, the head and the main landing gear door. The manufacturer distribution of the sections will be formalized after development of the design work.

Meanwhile, the JDA's Technical R&D Institute (TR&DI) has appointed Col. Tsutomu Kumagai as chief supervisor of the MT-X program and Yutaka Abe as deputy chief supervisor. It has also stationed five technical supervisors at KHI's Gifu Works where the basic design work is underway.

The ASDF will maintain the MT-X office at the Second Development Division and establish channels at the Air Proving Wing for the program.

CSO: 4120/77

JAPAN TO TRANSFER DEFENSE TECHNOLOGY TO U.S.

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 6-7

[Text]

The Japanese delegation at the third regular consultation with the Americans on defense equipment and technology, to be held in December or January, will declare that Japan can export defense technology to the United States irrespective of its arms export ban policy, according to Defense Agency sources.

This declaration will be Japan's final response to the United States' request for advanced Japanese defense technology which U.S. Defense Department officials submitted on the occasion of Japanese Defense Chief Joji Omura's U.S. visit last June.

The Japanese view of the declaration was jointly prepared on the basis of the Japan-U.S. Security Treaty by the Foreign Ministry, Defense Agency, and Ministry of International Trade and Industry following the U.S. request. The view also says that Japan can carry out joint research, development and production of military equipment with the United States.

At the coming consultation between defense officials of the two countries, the two sides will initiate discussions on specific items of technology for transfer to the United States, and also discuss joint research and development issues. Although the U.S. is said to have an interest in Japan's electronics and optics technology, an official request for specific items of technology is still pending.

The Defense Agency intends to start cooperation with the United States in defense technology with an exchange of visits by military engineers.

CSO: 4120/77

JDA ORDERS THIRD AIS FOR F-15

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 p 7

[Text]

The Central Procurement Office of the JDA has concluded a ¥6,624 million contract with C. Itoh Aviation to purchase the third Bendix avionics intermediate shop (AIS) for the F-15J fighter aircraft for the Air Self-Defense Force (ASDF) with delivery scheduled for October 1983.

The third AIS will be installed at Hyakuri ASDF Base. The first was ordered in FY 1979 for Nyutabaru Base and the second in FY 1980 for Chitose Base.

The first AIS, consisting of six stations, is now being installed at Nyutabaru Base for operational tests of the F-15 starting in January 1982. Its three stations have been tested by Mitsubishi Heavy Industries Ltd. which is undertaking production of F-15s under license by McDonnell Douglas Corp. The second system will be delivered between July and September 1982.

The three AIS systems will be used for the authorized 100 F-15s. If the JDA decides to procure more F-15s, however, additional AIS purchases would be considered.

CSO: 4120/77

ASDF MAY LAUNCH FS-X DEVELOPMENT IN FY 83

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 7-8

[Text]

The ASDF may start on development of the new FS-X support fighter aircraft as a replacement for the current Mitsubishi F-1 in FY 1983 to contend with F-1 retirements starting around 1990.

If F-4EJ fighter-interceptors are used to replace the retiring F-1s, however, the development launch could be delayed until FY 1987.

The ASDF is now considering the FS-X development project as part of a new medium-term defense program (MTDP) covering FY 1983-87. It has tentatively decided to procure about 70 F-1s for three 18-plane squadrons and reserves, although its original plan had envisaged 100 planes for three 25-plane squadrons and reserves. After purchasing 64 aircraft between FY 1975 and 1979, two to three aircraft have been ordered annually. This pace will continue till around FY 1985, when the ASDF will stop purchasing F-1s.

The service intends to establish three 25-plane support fighter squadrons under the FY 1983-87 MTDP as originally planned. In that case, it would have to make up for a gap of about 30 aircraft between the current 70-plane setup and planned 100-plane setup by the final year of the new MTDP. Additional purchases would also be necessary as replacements for aging F-1s. The ASDF is conducting studies on whether or not it should develop a new support fighter, or else use the F-4EJ to fill the gap and prepare replacements for obsolete F-1s.

CSO: 4120/77

ASDF PLANS DEVELOPMENT OF NEW RADAR IN FY 1983-1987

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 p 8

[Text]

The ASDF hopes that the TR&DI will launch a five-year program in FY 1983 to develop a new three-dimensional warning/control radar system for air defense, according to informed sources.

The service may set requirements for the radar system for submission to the TR&DI in March 1982. If the TR&DI agrees to incorporate the program into a budget request for FY 1983, the ASDF would request proposals for the radar project from contractor condidates in April, and choose a contractor around June. The contractor candidates include Toshiba Corp., Nippon Electric Co. and Mitsubishi Electric Corp.

The ASDF intends to install the new radar systems at eight of its 28 radar sites throughout Japan starting in FY 1990. The eight sites are now equipped with FPS-20 search radar and FPS-6 height finder radar systems supplied by the U.S. Air Force.

The remaining 20 radar sites are being equipped with the J/FPS-1 (F3D) or J/FPS-2 (modified F3D) fixed three-dimensional radar developed by the TR&DI.

The new radar system will be superior to the J/FPS-1 and J/FPS-2, with electronic counter countermeasures (ECCM) and improved durability. The ASDF plans to operate all three types of warning/control radar systems in future.

CSO: 4120/77

RESEARCH, DEVELOPMENT IN KEY MISSILE PARTS TO BE PROMOTED

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 8-9

[Text]

The TR&DI plans to fabricate electronic scanning antennas and rocket engines using the CDB (composite double base) propellant in FY 1982, starting in April 1982, to prepare for development and improvement of missiles in future. Research and development of such key missile components have been rated most effective worldwide.

The electronic scanning antenna is expected to be useful for reducing the size and weight and improving the reliability of various missiles, while the CDB propellant rocket engine is likely to increase overall missile performance.

The TR&DI has continuously developed various propellants for such missiles as the ASM-1 air-launched anti-ship, the SAM-1 short-range surface-to-air and the Model 79 MAT anti-tank models in cooperation with Daikin Kogyo Co., Daisel Ltd. and Asahi Chemical Co.

It developed a new solid propellant between FY 1963 and 1966, a high-performance rocket engine propellant from FY 1967, and a high acceleration rocket engine, as well as HAP and NP propellants from FY 1972. After FY 1975, it fabricated smokeless, high-thrust HTPB (hydroxyl terminal polybutadiene), MHD composite, RDX/AP composite, HMS-CMDB and other propellants. The CDB and other new propellants are expected to be developed for the planned XAAM-1 air-to-air and XATM-3 antitank missiles.

CSO: 4120/77

PREDEVELOPMENT TESTS UNDER WAY FOR NEW TANK

Tokyo JPE AVIATION REPORT-WEEKLY in English No 548, 25 Nov 81 pp 9-10

[Text]

The TR&DI has been conducting technical tests prior to engineering development of a new main battle tank (MBT) for the Ground Self-Defense Force (GSDF) starting in FY 1982 (April 1982-March 1983).

Since last May, it has carried out firing tests to confirm the performance of the 120mm smooth-bore gun and APDSFS and APDSMP projectiles. Tests in November were aimed at evaluating hit accuracy with the fire control system (FCS) used. Firing tests aboard a running vehicle will take place soon.

Technical research on the new MBT started in FY 1974 when the sophisticated Model 74 MBT entered service. The TR&DI had fabricated an FCS, hydraulic motor, 120mm smooth-bore gun, APDSFS and HEATMP projectiles, engine space, armor structure, chassis and other components by FY 1980 for system study in the current fiscal year. A ¥92.49 million contract for a system study to span the past technical research and the coming engineering development has been awarded to MHI.

The GSDF and TR&DI have earmarked ¥7,000 million for launching the engineering development in the FY 1982 budget request. They plan to develop the new MBT by FY 1988.

CSO: 4120/77

SCIENCE AND TECHNOLOGY

FUTURE COURSE OF MACHINE TOOL INDUSTRY

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981 pp 5-9

[Article by Yoshitaro Yoshida, director of Machine Tool Division, Machinery Department, Mechanical Engineering Lab., Agency of Industrial Science & Technology, MITI]

[Text] Machine tools have been improved greatly as a result of numerical control technology, making them easier to use. They show up in many different forms using systems and electronic technology. Let's examine Japan's machine tool technology from this standpoint, because it's expected that this trend will continue

Flexible Manufacturing Systems

Machining systems that are being used efficiently for many types of medium and lightweight machining are called flexible manufacturing systems (FMS). These systems were the result of numerical control technology, electronics, and machining tool technology. These systems have been invented due to increasing wages for labor, shortages in skilled machinists, and the lack of young workers with ability. Complete automation of machining systems is unavoidable necessity.

The necessary development of DNC systems, machining centers as system machines (Figure 1), and flexible machining systems with conveyor systems employing improved conveying equipment, has already been sufficiently carried out. There are already a number of these systems in operation. There are not only machining centers, but a variety of machines that are system machines with loading to a built-in NC lathe. With these system machines, flexible machining has been made possible. The FMS from Toshiba Tungaloy company is made up of a machining center, NC lathe, and grinding machine (Figure 2).

Simple combinations of machining centers is not the only development. It will probably become important for NC machine tool combinations to have a number of functions. In the future of automatic machining, machining tools must be able to pick up and remove the part being machined and be able to place them on or remove them from conveying systems. Robots are always available for this task, but from the standpoint of cost and amount of space taken up, it will be necessary to have robotics built in.

FMS are limited in their cutting and grinding ability, but it will be necessary to consider the assembly and inspection processes for production systems. Complete FMS systems will be demanded in the future. Assembly processes must especially be made simple and rational if they involve manual operations. For that purpose, we will have to have complex machining systems—FMC. This way of thinking must be further developed so that the assembly process will become more efficient. The active use of multi-purpose robotics is also important. It will be necessary to respond with combinations of robots as

Mechanical Engineering Laboratory

This laboratory conducts basic research for contributing to the mechanical industry, as well as research and development of new technologies. In specific terms, its research work covers systems engineering, heat and fluid technology, automatic control, safety engineering, antipollution technology, production engineering and many other fields.

For future-oriented problems, the laboratory is conducting studies on biomechanics, computerized production technology, technology to meet energy requirements, and the possibility integrating all such fields.

simple as possible. We will have to replan the division of work of machining, assembly, and processing. On the other hand, machining will have to be as accurate as possible. It will be necessary to have automatic designing of the part's shape so that it can be easily assembled.

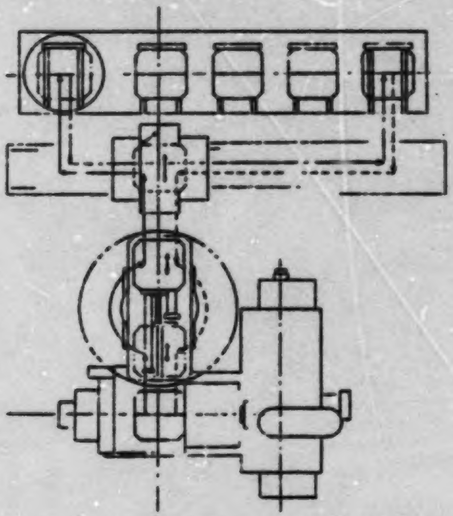
Electronics Allows for Automation

Electronics must be used to achieve the goal of complete automation. It will be applied in examination and diagnosis technology. Electronics is the most appropriate method for measuring and generating information for everything from simple dimensional measurements, to investigations necessitating human response, diagnosis of machining tools, pattern recognition techniques to replace the human eye, and different types of sensor technology.

Electronics and opto-electronics are best for deciphering information, newly generating command information, and for transmitting different information. In this manner, information generation, processing, and transmission will be widely performed with the development of microprocessors and miniaturization.

The main problems will then be: Which information to select, and how to process it to improve the SN ratio and input it. What will have to be done to the actuators changing output information as the machine progresses in its work to get better output.

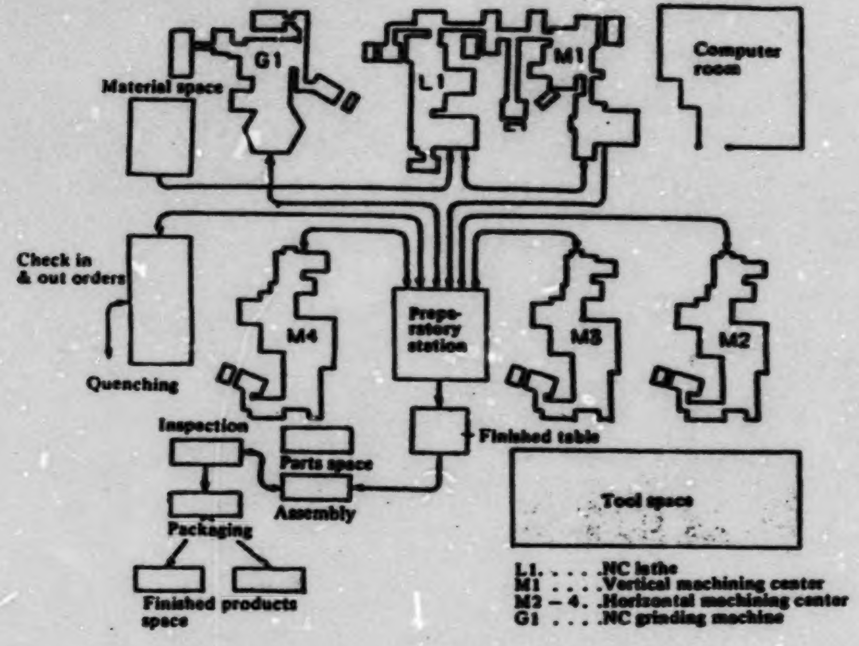
Fig. 1. Truck-Type Pallet Pool Line



New Capabilities Accompanying Electronization

It can be safely said that the information input/output section of machine tools has changed with the development of microprocessors. Other changes are the mini-

Fig. 2. Flow Chart of FMS in Toshiba Tungaloy Co.



aturization of NC equipment, high-speed processing, greater memory capacity, and expansion of the capabilities of the robotics. Input information has become more abundant with the miniaturization of sensors. It will be necessary for the machine tool's hardware also to be improved to more efficiently use this information. There has been a reduction in the number of gear-changing parts. Now we have DC motors that permit work on the main spindle without stepping. Ball screws were also developed to facilitate the transmission of commands from NC equipment. We have also seen changes in the driving systems, advancing from DC servo-motors to AC servo-motors.

In the future we will need to have sufficient torque at low speeds and good control of the driving systems at high speeds. We will be able to make the machines look smarter by inter-cooperative manufacturing with peripheral equipment. AC systems are examples of those that have been made smarter by using microprocessors in peripheral equipment. Electronics or microprocessors using sensors have been developed for the apparatus that can adjust to allow for the most appropriate cutting conditions.

These include controlling the cutting power or feed and cutting. The best signal system for controlling is the feedback system which controls after the cutting power changes. It will become necessary to have a feed-forward system that controls by forecasting changes. The problem will then be development of sensing techniques to forecast changes for that. One of those is the development of sensors which can investigate the workpiece not as a touch-sensor, but as a sensor able to sense it before touching it. This will become important in the future as more expensive workpieces and tools are used. It will be useful for improving the operation rates of the cutting machinery or for protecting the tools and workpieces.

There are many problems remaining that must be thought about, such as the combination of meters and machine tools. Efficient operation of microprocessors is awaiting on-machine, on-line meters with the capability of not only feedback control based on the dimensions of the workpieces, but also based on the surface shape and roughness of the workpiece and use of laser holography. We must also think about the new developments peripherals for machining tools.

NC Software (CAD/CAM)

We must first consider NC programing when talking about NC software. The first automatic programing system, APT, didn't stop with simply commands for movement of the tool, but went as far as permitting automatic designing of the processing. The establishment of machining conditions in EXAPT must naturally be included in the discussion of automatic program processing. For that reason, data collection of machining technology has become important. NC software is not merely programing the machine tool's path. It must also incorporate all of the information needed for creating a final product.

This generates many demands for program flexibility and for use in production administration. These demands include not only the shape description of the parts by software but also software for process planning: systems to automatically establish machining conditions and parameters for setting up machinery. This field of research has just been started and great hope is being held out for it. There is considerable demand for CAD/CAM total systems.

We can't forget to talk about data bases. The organization of data bases becomes very important with the development of systems and the abundance of system's contents. What kind of data base to prepare? Will the data base be unified? What applications will be made of the data base? These are all questions of software. Problems like these will increasingly become important: They must be researched so as to further progress.

New Machining Technology

It appears as though we are making rapid progress in getting machining data to set up data bases. Unless data base maintenance is made easier, we will not be able to put into using the modern technical information we are now developing.

This is the age of common construction steel and cast iron machining. With improvements in materials, we are seeing the entry of new materials for different tasks. In the same way, different tool materials have been developed and machining conditions have been altered. Of course, changes in machining apparatuses can also be seen. Cutting machine technology is responding it the task of cutting difficult materials with such technology as electro-chemical processing. The wire-cut machining tool is one example. Because the accuracy of the wire-cut machining has been improved, it is excellent at machining molds and is particularly good at trimming dies. With advancements in tool materials and improvements in machining technology, it has now become possible to work materials which have previously been too difficult. The result of improved machining accuracy allows for easier interaction with the grinding process. As hand-finishing techniques are being lost in our generation, this area too must be given proper consideration.

The development of new machining types using diamonds and CBN tools will require machining techniques which are better and with more capability. Will our current modern machining tools, in particular NC machining tools, be able to respond sufficiently to those demands? Machining tool designers and process engineers will have to put a lot of thought into this.

Construction Design and Machining Techniques

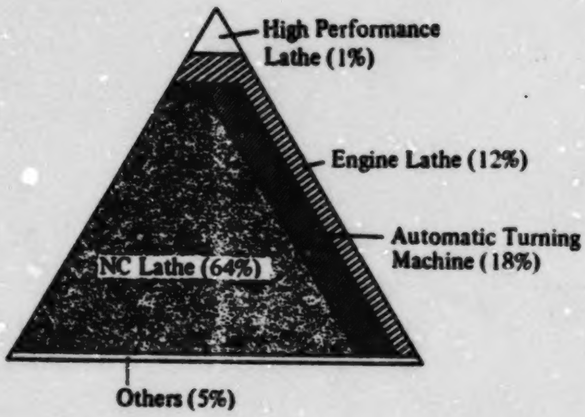
Let's think about how machining tools should be constructed. Take NC lathes as an example. They have, in general, become better and they are easier for the operator to operate due to electronics. One NC lathe is able to have six to eight tools and can shape a wide variety of designs in one turn of the lathe. Demand for lathes, which are easier to use and with greater rigidity, is due for the most part to the successive development of materials that are harder to machine. Accurate machining tools that have high rigidity have been requested with the idea of shortening the grinding process based on grinding a workpiece after heating. Of course, grinding machines in the future will have to be more accurate.

The next generation of materials to be used by future leading industries will include materials that are especially hard to work. Even the automobile industry of today is using hard-to-work materials such as super-high tensile steel. For that reason, there must be an overall improvement in the rigidity of machining tools and at the same time, ample consideration must be given to workpiece/machining tool, tool/machining interfaces.

As machining tools become rigider, parts such as the fixtures holding the workpieces (example: a chuck), and holding the tool (example: a tool-rest or collet), will have a greater relationship to machining capability. Only when tools and workpieces having sufficient rigidity are incorporated in machining tools, will the true capability of tools and tooling machines be forthcoming. This will depend on ways to attach the tools and workpieces that accompany the main spindle—making them more rigid; making it so that there will not be any vibration in the attachments during heavy grinding throughout the fixed lifetime of the tool. Full play cannot be given to tools or machining capabilities if either the tool or the workpiece is weak. Thus, careful thought must be given to the design of the relationships between tools, machine, and the workpieces. It will especially be necessary to further research the forces giving rise to vibration that occur between the tool and workpiece.

We must also gather data about machining that borders on other fields such as, ultra-precision machining, high-speed cutting, and high-temperature cutting. At the same time, we must carry out more research on the machining tools themselves (including peripheral equipment). In this case, it will be necessary to advance research by cooperating with certain fields having to do with meters that will be used on-line during machining, and on the machine. Because the problem of surface changes in quality, strata are included within these problems, so we must further study such points as machining conditions and the strata of machining quality changes, strata and parts accuracy, and durability.

Fig. 3 Lathe Production



Future Tasks

We have listed a number of the problems that must be considered as we approach the year 2000. In this section, we would like to mention some other problems as well.

We must research: High-speed cutting, based on new tools, for mechanical machining techniques; ultra-precision machining equipment and machines that can work on new materials; new machining techniques for specialty materials; and high-capability cutting techniques. For machines like these, it will be necessary to have advanced mechanical technology. Figure 3 shows, from a financial point of view, the manufacturing rate of lathes. NC lathes are still in the development stage but their main feature is ease of use. Although there are engine lathes which have high capabilities (strong cutting and high precision), I think that there are very few with such capability. It is necessary for Japan, in our pursuit of becoming a technical-based nation, to develop machining tools that we will be proud of, which other nations will seek to imitate. It will be necessary to have an accumulation of not only electromechanics but also basic mechanical technology.

It will be necessary to introduce electronics technology for the efficient use of systems technology. It will have to be electronic technology of investigative diagnosis and on-line metering techniques. It must even include so-called machining intelligence. It will be necessary for the cooperation of various fields — applied physics, applied chemistry, and electronics—to make the machines more intelligent. We must re-examine the basics of machining and not research the problem from just the electrical standpoint. In the future development of machining, we must think about the harmonious cooperation among various fields. The essence of mechanical machining techniques—the essence of machining tools—is basic technology that is steadily developing mechanical technology. Unless this field is developed, the future progress of machining tooling will be slow. We must make up our minds to take a new and more innovative look at mechanical technology. ■

CSO: 4120/74

CURRENT TRENDS OF MACHINE TOOL INDUSTRY

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981 pp 11-15

[Article by Shinshichi Abe, managing director, Japan Machine Tool Builders' Association (JMTBA)]

[Text]

Seeking Further Promotion of Orderly Marketing Activities

Machine tools have assumed a strong character of classification as an international product. Since the export ratio of Japanese machine tools have maintained a 40 percent level despite expansion of the production scale, we should become aware of the fact that the machine tool industry should be fully considered from the international viewpoint instead of only the domestic point of view.

The following is a general view of the recent business trend from the machine tool industry side.

[illegible]

A 1980 tabulation of the volume of orders of 68 leading companies belonging to the Japan Machine Tool Builders' Association (JMTBA) amounted to 621.5 billion yen (currently about 230 yen level to the dollar) which is a 42 percent increase over the preceding year. It is estimated that the figure will reach 820 billion yen when calculated on a national basis. It is noteworthy that the each total of both the 68 companies and the national basis were the highest to date indicating an increasing trend on a continuing basis.

A look at the 1980 ratio of machine tools by demand (user industry) showed that general machinery occupied 29 percent followed by automobiles with 27 percent and exports 26 percent. These three demand sectors occupied 82 percent of the total.

In reviewing the principal sectors which were the key factors in the growth of demand, the contribution ratio of automobiles was 53 percent in 1976, the export contribution ratio was 52 percent in 1977, the general machinery ratio 52 percent in 1978, the automobile, export and general machinery ratios were all high in 1979 and the automobile contribution ratio was 40 percent in 1980. In this manner, these three sectors assumed the role of an engine for the past several years. It could be said that this general trend will continue for some time.

The reasons for this machine tool development are a further strengthening of depreciation demands in industrial circles since the first oil shock, the carrying out of brisk activities toward diversity and model change in order to stimulate demand and matching demand by improving quality and producing compact precision tools. Other reasons are the introduction of labor-saving and unmanned machines to cope with a lack of skilled workers and the aging of workers in industrial circles, brisk plant investments due to changes in the international investment environment, the renewal of plants built during the high growth period and the expansion of overseas markets on a global scale.

In reviewing the developments mentioned earlier, the volume of orders remaining as of March 1981 amounted to 318 billion yen on the basis of 68 member companies of JMTBA. The figure represented a 21 percent increase over the same month of the preceding year or about a six-month volume of orders.

However, the high machine tool order trend has tapered off markedly from the beginning of 1981 as indicated by the 16 percent increase in January over the previous year, a seven percent increase in February and no increases from March to May. The growth rate from January to March showed an increase of only seven percent over the preceding year. Attention is focusing on future trends because the growth reduction has been noted in all fields including overseas demand, automobiles and general machines.

[illegible]

The trend of advance-orders is as mentioned earlier but a look at the actual production situation on the basis of 'dynamic statistics' compiled by the Ministry of International Trade and Industry in 1980 showed that the output amounted to 682.1 billion yen. The figure represented a 41 percent increase over the preceding year.

The production total amounted to 228.6 billion yen during the bottom period in 1976. Since that year the production total of machine tools has increased about three times and continued to grow for four consecutive years.

Of the total, the output of numerically controlled (NC) machine tools which has attracted world attention, amounted to 339.4 billion yen or a 65 percent increase over the previous year. The ratio of NC machine tool production to the total machine tool production is almost 50 percent and the highest in the world. The production weight amounted to 275.000 tons or a 25 percent increase over the preceding year. However, this was a 23 percent decrease when compared with the peak year in 1970.

As a reference, the 1980 production of machine tools prepared by the American Machinist showed that the U.S. was in first place with $3.78 billion followed by West Germany in second place with $3.26 billion, Japan in third place with $3.0 billion, the Soviet Union in fourth place with $2.41 billion and Italy in fifth place with $1.14 billion.

Sales

Sales statistics prepared by the Ministry of International Trade and Industry showed that sales amounted to 680.5 billion yen which was a 39 percent increase over the preceding year. The figure indicates a continuous increase for five consecutive years.

Inventory

Statistics prepared by the Ministry of International Trade and Industry showed that as of March 1981 the machine tool inventory was 16,000 tons or a 26 percent increase over the preceding year. The figure represents a 0.6 month supply which is an appropriate inventory on the average.

Exports

The Finance Ministry's customs clearance statistics for 1980 showed that exports of machine tools were favorable and amounted to 269.6 billion yen or a 30 percent increase over the previous year. Since 1976 exports have shown a remarkable increase. Although Japan's machine tool exports have been shipped to markets all over the world, there are some problems because the market share has centered on the U.S. and European areas and has not spread fully to other areas. Also, there has been a sharp rise in exports in recent years with the majority of exports consisting of NC machine tools.

NC machine tool exports amounting to 172.8 billion yen account for 64 percent of the machine tool export total of 269.6 billion yen, an increase of 73 percent over the previous year.

Exports toward Europe amounted to 70.1 billion yen or 26 percent of the whole share, those toward North America 113.1 billion yen or 42 percent and those toward other areas 86.4 billion yen or 32 percent.

The 1950s was an era of imports because the 1957 Japanese export ratio registered only 5 percent while imports totaled 45 percent.

During the first half of the 1960s a similar trend continued but since the latter half of the 1960s Japan entered into an age of self-sufficiency structure (13 percent export ratio and 11 percent import ratio in 1972). Since then this country has turned into a full-scale machine tool export country from the mid-1970s.

In the above process, the machine tool industry has been endeavoring to develop high performance and high precision models which can be relied on by users. Greatest efforts were made to promote technical development while struggling to open up both domestic and overseas markets through market surveys, before- and after-sale service studies and sales base establishment.

The present status of Japanese machine tool industry, therefore, cannot be attributed to the "so-called" dumping acts but to the accumulation of export knowhow gained after a series of trials and errors.

In other words, the industry is now actually on a steady road toward expansion on the basis of confidence by users all over the world in terms of performance, precision, prices, punctual delivery and competent after sales service.

On the other hand, it is true that various criticisms have started to be aimed at Japan due to the fact that the timing of full-scale export expansion occurred during the latter half of the 1970s.

Unfortunately, this fell on the recession period in all the advanced nations and the machine tool industries in all Western countries, except the United States and West Germany were not necessarily brisk while technical development for NC machine tools in those countries lagged considerably behind their Japanese counterparts.

We should make an effort to establish friendly co-existence with foreign counterparts throughout the world through greater development and supply of such models which can contribute to the promotion of the machine tool industry of the world while listening to the voices of foreign counterparts in a serious manner and maintaining the free-trade principle in a free economy.

We will continue to export products in a satisfactory fashion in the future. NC lathes and machining centers are currently exported to the United States and European countries under the Japanese Government's minimum export price regulations. They have been decreasing in both areas after the peak period in mid-1980.

Today, the age of merely exporting manufactured goods from Japan has passed and it is expected that further efforts will be made for local production, capital participation and technological transfer in every consumer nation.

Imports

Japan which used to be an importing country of machine tools, has now changed to an exporter as stated earlier. In 1980, Japan's import total amounted to 38.2 billion yen or 46 percent of the preceding year, marking its import dependence ratio at 8.5 percent. The average rate for the past five years from 1975 to 1980 registered 8.4 percent.

Most imports come from the three nations of the U.S., West Germany and Switzerland, occupying 77 percent of the Japanese import total.

Imports from the U.S. amounted to 9.6 billion yen or a 64 percent increase over the previous year, West Germany 11 billion yen or a 12 percent increase and Switzerland 8.3 billion yen or a 75 percent increase.

Other leading countries include South Korea, Taiwan and Singapore.

The characteristics of imported machine tools involve high precision, ultra-large and special performance types as well as small models, multi-purpose lathes or the so-called 'low-price products' which cannot be produced in Japan.

It can be generally said that foreign makers' sales efforts of machine tools on the Japanese market seem to be insufficient.

It may be necessary for them to strive to encourage Japanese users to purchase their products through positive participation in trade shows held in Japan by exerting greater ingenuity in an increased number of exhibit models.

The above report gives a general picture of Japan's machine tool industry by reviewing each field of orders, production, inventory, exports and imports.

Since the Japanese machine tool industry, as mentioned above, has established a leading position in the world, it is hoped that we will be able to secure a means of coexistence with our foreign counterparts.

We should fully realize this position and contribute to the world economy by possessing reflective thoughts so that our actions will be properly assessed as worthy of being called "world businessman." ■

CSO: 4120/74

MACHINE TOOL BUILDERS COMMENT ON INDUSTRY

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981
pp 17-21

[Text] The following are the answers for which DJIT has put questions to leading machine tool builders here. Full responsibility on the contents depends on DJIT. --Editor

[Comments by Shozo Koyama, chairman, Dainichi Kinzoku Kogyo Co., Ltd.]

On Overseas Advance

Requests for plant construction from New York, Illinois, Miami, Los Angeles and Seattle are now under study, but it is considered essential for us to realize local production in one way or the other.

The State of New York is enthusiastic in inviting manufacturing plants and within this scope we are planning to work out our basic policy toward the issue including the problems of manpower and wage in Chicago and Detroit.

On Future Marketing Policy

First joint-venture company has already been established in South Korea and the second in Singapore.

All the ASEAN countries, therefore, are being considered similar projects.

In the U.S., NC machines are playing a major role while the multi-purpose machines in Singapore. The machine tool industries in local circles have been proceeding with their advance in the NC field. Accordingly, we are taking positive steps in receiving trainees from these countries because we believe that Japanese machine tool industry should encourage overseas expansion.

On Future Key Export Lines

The NC machine will be shipped mainly to the U.S. while exports toward Singapore will start with multipurpose machines and gradually shift to the NC machine.

On New Technological Developments

It is particularly essential to develop technologies for aircraft machine tools. It is expected that NC and robot development will be steeped up while efforts for labor-saving and unmanned operations will be further encouraged.

On Steps for International Cooperation

My theory of supporting international division of labor has been long and has been voiced many times. The question is how we should carry out international division of labor.

From an international point of view, it will be ideal for Japan to be in charge of 'process technolgy' which is its strong point. It is, however, necessary at first for Japanese domestic manufacturers to consult each other, centering on the Japan Machine Tool Builders' Association. After this, a system for the international division of labor should be discussed chiefly among Japan, the U.S. and the EC. This will be a big task for us in the future.

[Comments by Seiji Okoshi, manager, International Operations, Precision Machinery Division, Second Machinery Headquarters, Mitsubishi Heavy Industries, Ltd.]

On Overseas Advance

Mitsubishi's local corporation called Mitsubishi Heavy Industries America has established sales and service bases in Atlanta and Detroit while in Europe, sales and service activities are being exercised at its Paris office.

In regard to local production, it is presumed that long-term views of such problems as trade friction, prompt service to customers and yen exchange, indicate that some form of local production will have to be carried out in the near future.

In an attempt to establish a local corporation, positive sales activities will be practiced first and then a local base will be set up.

On Future Marketing Policy

Focal markets will be Latin America, England, West Germany, France, Switzerland and the Scandinavian countries. The Soviet Union and Eastern Europe will also be targets.

In the past, a considerable amount of sales to these countries has been recorded but it will be necessary to cope with them in light of their economic status and 5 to 10-year programs.

In any event, it is true that there are three main markets consisting of the U.S., Europe and the Soviet Union plus Eastern Europe.

Due to the aggravated foreign currency situation, few transactions have recently been conducted toward the South Korean market where Mitsubishi Heavy Industries has already made inroads into the automobile related field. If its economy turns favorable, exports to South Korea will be activated.

On Future Key Export Lines

Horizontal boring machines has recorded good sales results in the U.S. It is predicted that the single unit of NC machines, large machining centers and large processing systems equipped with processing knowhows, transportation devices and tool-exchanging apparatus will expand sales. For the Western nations, small-sized machining centers (mainly of the horizontal type) constitute a key model.

Besides, there is gear hobbing machines designed for gears to be used for automobiles, agricultural and construction machinery.

In addition to the above, the multi-spindle automatic turning machines technically licensed by National Acme Co. of the U.S. is being mainly exported to the socialist countries including the Soviet Union.

On New Technical Developments

The much-publicized FMS (Flexible Manufacturing Systems) has now been put on the domestic market and its sales results will determine the possibility of future exports. Since we have already obtained actual sales results, there is no anxiety about the FMS, but it is our desire to employ a system where orders can be received in one body because it is necessary for us to prepare various combinations suitable to differing needs from customers.

Robots comprise two kinds of models for painting and welding, whose techniques are also being transferred from National Acme Co. and Warner Swasey Co. of the U.S.

On Steps for International Cooperation

A look at the history of the machine tool industry will compel us to take a choice of international division of labor. It is considered that Japan's role will focus on NC small-sized machine tools and a certain degree of quantity control and self restraint will be indispensable.

In the U.S., such a trend can be seen to some degree. For instance, the production of machine tools which requires highly advanced technology for aircrafts proves to be a good example.

[Comments by Minoru Matsuda, engineer manager, Overseas Operations Section No 2, Administrative Section, Export Division, Mitsui Seiki Kogyo Co., Ltd.]

On Overseas Advance

Mitsui Seiki Kogyo has been exercising technical licensing with foreign manufacturers since the 1960s including the French Government-managed Renault's Plant Administrative Bureau in 1957, U.S. Excello Corporation in 1963, Pratt & Whitney Inc. in U.S. in 1970, etc.

We have especially advanced into the Soviet Union at the same time as France. Therefore, its history of overseas advance is quite long. The key marchandize was jib borers at the start. At present, sales and service in Europe are based on Mitsui Seiki Europe S.A. while in the U.S., machining centers, jib borers and jig grinders are mainly being marketed through Mitsui & Co.

Although technical tie-ups with overseas capitals have long been practiced, there exist various problems beyond control, particularly, in terms of management because in actuality, high productivity similar to that now envisioned in Japan could be hardly expected without complete adoption of Japanese type management.

On Future Marketing Policy

It is hoped that the U.S. Midwest and South Africa will be the target of our overall export efforts.

As far as the developing countries are concerned, the current steady development efforts will be pursued for opening markets in this field.

On Future Key Export Lines

This category includes machining centers, jig grinders, NC screw grinders. About half of these exports will be shipped to the aircraft industry.

On New Technical Development

FMS will play a key role in the development of new techniques. Future technical advancement will be directed toward 100 percent unmanned operations with development of peripheral equipment proceeding simultaneously.

As the development of a monitoring system is important, it is expected that techniques for tool breakage prevention and automatic measurement functions will be raised to higher levels in the future.

On Steps for International Cooperation

International coordination is considered necessary because if the machine tool industry fails to work together, it could suffer a setback.

It is, therefore, essential to establish a form of cooperative structure through some effective measures, especially under the leadership of MITI (Ministry of International Trade and Industry).

[Comments to Hajime Okuma, director & manager, Export Department, Okuma Machinery Works, Ltd.]

On Overseas Advance

It has become necessary to possess a production base no matter in what form in major overseas markets.

From the viewpoint of trade friction, production bases play an important role in achieving local production, local procurement of devices, enlargement of local employment opportunities, cooperation with local manufacturers and a positive sales posture to sell products on good terms.

In addition, local production is indispensable because of the need for service function as well as special function to manufacture products which meet local requirements. Local production is also necessary to collect information on new techniques and new machine development.

On Future Marketing Policy

The current share of overseas markets is 45 percent for Europe, 40 percent for the U.S., and 15 percent for Australia, Taiwan and South Africa.

It is expected that the ratio of the U.S. market will become larger and larger in the future because of increasing sales in oil-related industries and the aircraft industry.

On Future Key Export Lines

The NC lathe has occupied the majority of exports so far, but in the future the machining center is expected to increase sharply. In other words, exports will center on NC lathes, machining centers and NC grinders. Since our company has produced its own NC equipment, we are able to assemble FMS under our own technique, thus allowing smoother FMS production and development of a 'more flexible' production system.

On New Technical Development

Our techniques which have been put to practical use, include automatic measuring technologies, automatic tool control system, automatic transportation system in a broad sense (for instance, robots, loaders, conveyors, etc.)

Although still in the experimental stage, a robot equipped with the pattern sensor is now in the R&D stage.

On Steps for International Cooperation

It is most important to exchange techniques and capital by establishing a cooperative system with local industries, through the offering of designing and production techniques while locally procuring labor, capital, production equipment and parts from related industries on the other side.

Since the machine tool has a special character, it is believed that international cooperation will be limitedly needed by the Western advanced countries because the growth rate of technical standards and related peripheral equipment should be thoroughly taken into consideration.

[Comments by Shigeru Ohta, managing director, Osaka Kiko Co., Ltd.]

On Overseas Advance

Requests for building plants from Europe in particular are now under careful study. Joint venture possibilities which involve various business treatments, differ in terms and conditions between nations and involve the marketing territory issue, are also under further examination.

On Future Marketing Policy

The U.S. and European markets are now in the process of development. In the future, Australia, South Africa, India and Israel will be considered as prospective markets in view of broadening the export base. At the same time, we are studying the development of the socialist markets.

On Future Key Export Lines

Vertical&horizontal MCs, multi-purpose millers and NC milling machines are involved in this category.

On New Technical Development

It is expected that further development of new techniques for greater unmanned operations will advance in the near future. Greater application of robots and technical revolution for peripheral technology will accelerate labor-saving efforts.

On Steps for Internation Cooperation

A general view seems to be that it is absolutely necessary to maintain orderly marketing policy as improper price dumping will cause trade frictions. Such improper business practices represent a problem. It is a problem of management conscience. Unfair sales tactics by a few which are currently being done even at domestic market will put the industry as a result in trouble.

[Comments by Tsuguo Suzuki, managing director, Seiki International Co., Ltd., Export Division of Hitachi, Seiki Co., Ltd.]

On Overseas Advance

Our company has started partial production of NC lathes in New York State from January 1980. The production volume is still small but we would like to make it an important overseas base in the future. Furthermore, in April 1981 we have constructed a new factory in Congers, New York which has started production. At present the company employs about 70 workers in the combined production, sales and service fields. The monthly production capacity is 12 to 13 NC lathes with plans to increase monthly production to 20 units before the end of 1981.

The main reason for carrying out local production is to provide a feeling of trust to local users. In the machine tool field, the most important thing is to win confidence which includes the technical and service fields.

Through the start of machinery production, it is possible to accumulate technical knowhow in production of peripheral equipment and systematization and to easily realize locally FMS which is our future policy course.

The other reasons are the need to overcome foreign exchange problems, personnel costs and rising parts costs. Local production has its merits on the cost side because it reduces cost price differences between the U.S. and Japan.

Future Marketing Policy

The current market distribution shows the U.S. in first place with 50 percent followed by Europe with 30 percent and others with 20 percent. The future plan is to establish the export proportion to the U.S. at 30 percent and increase exports to the Far East and Southeast Asian markets. There is also a plan to develop promising markets in the Soviet Union, Hungary, Yugoslavia and Bulgaria.

On Future Key Export Lines

As mentioned earlier, NC lathes and machining centers are expected to become the principal export items in the future. However, the trend appears to be greater rather "system exports" than machinery ones.

On New Technical Development

The ultimate goal of technical development calls for complete automation and unmanned machinery operations. Future development is expected to center on FMS for large-variety small-quantity production. For example, the development of devices using laser beams will lead to higher speeds and stronger horse power for single-unit machines.

Furthermore, exports of aircraft industry-use machine tools are expected to increase during the next five to six years such as the five-axle machines of large machining centers because of sound demands from the aircraft industry.

By fitting machinery processing knowhow into NC equipment, it has become possible for untrained workers to operate various types of machines. Although the quantity of NC machinery is still small, some users have installed these machines which indicate that fixed NC machine tools will increase more and more in the future.

On Steps for International Cooperation

In the past, Europe has been the center of machine tools with many makers in the area operating factories with 300 to 500 workers. Therefore, it is possible that NC lathes and machining centers among machine tools exported to Europe will cause friction if exports increase suddenly and become targets of import restriction moves. The EC has already started watching imports of Japanese machine tools.

On the advancement of factories in Europe, there is little merit because the machine tool industry's condition is different from the situation in the U.S. A concrete measure which can be considered, is to engage in joint sales with local makers or carry out technical tie-ups. There are considerable mutual benefits if tie-ups with local makers are carried out by taking such measures as the joint development of new products.

[Comments by Shigemitsu Asai, president, Toyoda Machine Works, Ltd.]

On Overseas Advance

Although Japanese machine tools have grown into an international product, there have been growing voices advocating protectionism in the U.S. and European markets. In order to secure stable exports in the future, it has become necessary for Japanese machine tool makers to carry out local production, provide technology and engage in joint ventures by cooperating with importing nations.

There is also the problem of international division of labor from the international competitive power viewpoint. In considering what country is the best in the world from the cost side, it cannot be necessarily said that cheap labor will emerge as the winner in international competitive power.

Unlike the equipment industry, machine tools have high technical skills to a certain degree which makes necessary such conditions as peripheral facilities with high productivity and comparatively easy access to materials. Even if overseas advance is carried out because of cheap labor costs, the cost of finished product will be high.

Our company has established the TKB (Toyoda Koki Do Brasil) local company because of anticipation of future industrialization and development of abundant resources in Brazil. As a preparatory step toward the production of multi-purpose machine tools, Toyoda Machine Works has started with a factory producing automatic lathes.

At the same time, the company has established a joint venture company in France by joining hands with Somua which is a local machine tool maker . The HES-Toyoda has started production of machine tools including MCs.

On Future Marketing Policy

There will be growing demand for NC machines, FMS, etc., because of moves toward unmanned and labor-saving machines as well as diversity in market development of such bright industries as electronic and aircraft industries. Therefore, we think that there is need to develop markets for these machines.

Cour company's grinding machines are expected to turn to CNC grinders on an increasing basis. The supply and demand gap in the North American market is expected to be narrowed in the near future and multi-purpose machines which have international competitive power are expected to become the main products.

In Europe, the sales route will be expanded through HES-Toyoda. There must be caution in dealing with the Soviet Union and East European countries because of political risks. Exports in this area will consist of advanced machines. They will center on grinders including specialized machines.

On Future Key Export Lines

Grinding machines and machining centers will become the principal export machines. It is believed that the competitors will not be the local makers in that country but Japanese companies carrying out local production by building factories in the country. It is also possible to export FMS.

On Technical Development

There has been a growing trend toward the use of unmanned and diverse machines through the application of electronization, CNC, FMS, CAD/CAM robots, etc. We must work out countermeasures to develop machines to cope with the development of new processing materials such as fine ceramics and new sophisticated elements, and industries expanding in the future.

On Steps for International Cooperation

Since it is not possible to consider the position of only one country in the machine tool industry today, it is necessary to stand on a premise of mutual prosperity. Machine tools are key industries in every nation. Therefore, Japan should not forget that importing machine tools from other nations will contribute to their prosperity. Concrete measures include international division of labor by machine type, local production, technical export, joint development and price policy. ■

CSO: 4120/74

MARKET TRENDS OF MACHINE TOOL INDUSTRIES

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981
pp 25-28

[Text]

Machine Tool Builders Start to Expand Sales Networks

Japan's machine tool industry has been caught up in a boom for the last five years and it has started to sing the praises of unprecedented success. The main pillars of the boom have been NC lathes and machining centers and today, when two-thirds of 1981 has already passed by, the continual entry of manufacturers into the production to these two types of machine has served to intensify sales on the domestic market. Some manufacturers have even gone so far as to endeavor to get to grips with the situation by cutting their prices.

Production Trends of Machine Tool Units in FY 1980 (Unit: million yen)

Item	Quantity	Amount	Comparison with previous year (%)	Inventories
Mechanical clutch	29,342	809	108	5,092
Electromagnetic clutch	3,178,283	20,088	121	181,468
Lead screw	489	47	–	0
Ball screw	111,610	9,906	024	0
High-speed transmission shaft	4,203	563	83	0
Other parts	4,504	672	–	0
Parts total	3,328,431	32,085	140	186,560
Dividing head	8,245	1,003	141	1,230
Rotary table	6,837	1,326	141	429
Machine vise	23,051	924	113	4,551
Other accessories	38,717	579	449	1,143
Accessories total	76,850	3,832	148	7,353
Scroll chuck	91,510	3,288	106	10,641
Four-click independent chuck	9,275	737	109	1,736
Miscellaneous hand operated chuck	15,622	329	133	151
Power operated chuck	39,917	4,401	166	6,477
Magnetic chuck	15,068	1,699	119	1,149
Collet chuck	5,830	93	–	3,490
Live center	45,680	475	111	7,650
Miscellaneous work holding device	299,272	852	131	7,052
Work holding device total	522,174	11,874	88	38,346
Collet	487,488	2,132	–	7,714
Holder	212,731	5,712	158	2,688
Sleeve/Socket	126,432	708	64	2,001
Arbor	49,937	616	99	1,312
Drill chick	1,923,596	2,815	112	174,944
Miscellaneous tool holder	412,281	3,091	131	2,138
Tool holder total	3,212,465	15,073	196	190,798
Coolant separator	3,778	370	152	155
Miscellaneous accessories	30,597	540	–	0
Accessories total	34,375	910	–	155
Grand total		63,774	137	

(Source: Machine tool unit manufacturers Association of Japan)

More and more individual manufacturers are setting their sights on expanding their shares of the domestic NC machine tool market and have started to expand both their domestic sales and servicing networks. One prime example is Mori Seiki, one of the nation's top builders of lathes. It aims to increase the number of domestic offices from eight to eleven before the end of the year. Another example is Osaka Kiko which is said to plan to increase the number of sales bases to 19 by the close of the accounting year ending May 1982 and, in addition, it is paying far more attention to its after-sales servicing than before. Okuma Machinery Works has decided to give test runs of its NC machine tools at its sales bases nationwide, set up "NC Centers" where on-the-spot training can be provided and open showrooms in areas heavily populated with users by means of separate companies.

This series of moves is seen as a prompt reaction on the part of the manufacturers to the fact that the domestic demand for machine tools slumped during the second quarter of this year below the level set in the same quarter of last year for the first time in five years. Manufacturers have come to the common awareness that the way to overcome competition on the market lies not only in providing products with a high quality but also in offering to users good service and in particular services which match the technical sophistication in machine tools.

In reaction to this build-up of networks by manufacturers, the dealers of both machines and tools which control most of the domestic distribution of Japan's machine tools see this as a threat to their own standing and, against the backdrop of increasing technological sophistication, it remains of interest to see exactly how these dealers will tackle the latest offensive launched by machine tool makers.

Machine Tool Unit Market

According to the Machine Tool Unit Manufacturers' Association of Japan, the production of machine tool units in 1980 increased by 37 percent to 63,774 million yen over the previous year with shipments jumping 35 percent to 64,564 million yen.

The fast-paced growth in the production of machine tool units is accounted for not only by the boom in machine tools but also by the broad-based increses in the production and shipments of products related to numerically controlled machines.

One example is ball screws which are indispensable not only to machining centers but also to other NC machines. In 1980 their production more than doubled to rise by 104 percent to 9.96 billion yen over the year before. The production of other items also increased rapidly: round tables (up 41% over the year before), holders (up 58%) and coolant separators (up 52%). In each case, the increases were a reflection of the growth in the demand for NC machines.

In 1979 the members of the Machine Tool Unit Manufacturers' Association of Japan numbered 46 but this jumped to 58 in 1980. The advances made in adopting NC techniques into machine tools have brought far-ranging changes to the production set-ups of manufacturers.

Drilling Machine Market

Drilling machines are used to make holes in metal and it was once thought in Japan that they would be replaced in the not too distance future by machining centers.

However, compared with other machine tools, their unit price is low and so there has been a constant renewal demand from small-scale machine manufacturers. As a result, the builders of drilling machines have adopted at the moment a full production set-up centering on radial type machines. In terms of value Japan's general-purpose drilling machine market was worth 7.6 billion yen in 1977, 8.4 billion yen in 1978, 10.5 billion yen in 1979 and 11.5 billion (currently about 230 yen level to the dollar) in 1980 (with 40,202 units), which is an annual growth rate of more than 10 percent. The demand this year is expected to rise about 20 percent in value over the figure established last year with a projected increase in quantities equivalent to 11 percent. These are the generally quoted predictions by the industry circles.

There are several factors which are responsible for the deep-rooted demand for drilling machines as noted by industry sources:

1) the ongoing equipment renewal among the users who cannot afford to purchase high-priced machining centers,

2) the heavy burden of machine depreciation for users with high-priced machining centers seeing as the machine costs for drilling work are low,

3) the fact that no skilled workers are required as they are with other machine tools.

To cope with the rising demand, the drilling machine builders are streamlining their production processes and implementing out-and-out planned production. No moves are being made with plant and equipment investments.

Yet while numerically controlled machines are taking this island by storm, the fact that there is a continued deep-seated demand for general-purpose machine tools such as the drilling machines is an indication that the base line of the industry will be expanded even further as Japan's machine tool industry comes to the one trillion yen market on an annual production basis.

Cemented Carbide Tool Market

The Japan Cemented Carbide Tool Manufacturers' Association recently announced the production and shipment figures for cemented carbide tools in 1980. Accordingly, the total production of cemented carbide alloy tips came to 165.5 kg which represented a 7.4 percent increase over the previous year. This breaks down into a 14.5 percent increase over the year before for cutting applications, a leveling-off for anti-corrosion applications with a mere 0.5 percent rise, and a 2.9 percent decline for mining and civil engineering applications. The shipments of marketing tips and molded tools rose 26 percent over the year before to 102.8 billion yen. Exports were up by 11.7 percent over the same period to 7.8 billion yen.

Inventory Trends

The Japan Machine Tool Builders' Association recently released the fact-finding survey on production figures for NC machine tools in 1980. A total of 63 leading members of the Association were surveyed. According to this survey, the production and shipment quantities of NC machines in 1980 rose sharply over the levels set in the year before but at the end of the year the total inventories jumped just over 30 percent on a year-to-year basis. In particular, there were large-scale increases in the inventories of NC lathes and machining centers, which was evidence of excessive supply.

Inventories stood at 1,191 units worth 17.7 billion yen, increases of 32.5 percent and 38.1 percent over the year before. In terms of the quantity and value of the average shipments per month in 1980, they represented only 75 percent and 66 percent of the figures per month, respectively and now they do not pose any particular problems for the future. Yet about 90 percent of all the inventories are NC lathes and machining centers—in contrast to NC milling machines and grinders which have reduced inventories—which leaves no doubt that these particular machines are in a state of excessive supply.

Production, Shipments & Inventories of NC Machine Tool

(Unit: quantity/set, amount/million yen)

Type	Performance in 1980						Production plan in 1981	
	Production		Shipments		Inventories			
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
NC lathe	9,911	137,789	9,637	137,400	737	9,053	9,231	126,715
NC drilling machine	195	1,798	195	1,808	11	214	293	2,345
NC boring machine	158	11,600	147	11,083	14	572	202	13,939
NC milling machine	1,775	23,910	1,748	23,768	58	533	2,784	42,941
NC grinding machine	183	4,420	189	4,471	30	540	375	9,420
NC special purpose machine	113	6,022	116	6,153	14	241	139	9,383
Machining center	4,820	108,902	4,691	107,697	242	6,279	6,417	145,378
NC electric spark machine	2,335	29,571	2,350	29,561	85	293	3,783	45,715
Others	54	1,345	54	1,345	0	0	33	1,725
Total	19,544	325,357	19,127	323,286	1,191	17,725	23,257	397,561

CSO: 4120/74

SCIENCE AND TECHNOLOGY

TRENDS IN METAL FORMING MACHINE INDUSTRY

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981
pp 37-42

[Article by Hiroyasu Kagawa, managing director, Japan Metal Forming Machine Builders' Association]

[Text]

General

The forming machine belongs to the same category as metal working machinery or machine tools. It is broken down into many types according to the processing method. (However, in Japan, each industry of machine tools and forming machines forms the association independently – editor)

The most widely used types are mechanical presses, hydraulic presses and sheet metal cutters as well as various machines for powdered molding, forging and extrusion molding. There are also wire-forming machines for wire-material processing.

The forming machine requires special quality technology in order to manufacture on a large scale, uniform shaped and high-precision products in an economical manner. The machine must also produce raw molding materials which are very hard, and large molding materials. Because of this special characteristics forming machines are important production goods in the machinery industry especially in the automobile and electric machinery industries which are mass-production oriented industries.

Japan's forming machine technology has made remarkable progress during the past 20 years accompanied with the development of the automobile and electric machinery industries which are main customers.

The advance technology of Japanese forming machine industry has also been highly appreciated at overseas markets including advanced countries and developing countries. We are convinced that our forming machines have been contributed to the industrial development of these countries.

The primary objective of forming machines focused on constant industry efforts to improve the level of high speed, automation and high precision of the machines together with the promotion of technical development to produce many types of machinery in recent years. For example, the development of automatic exchange systems for metal patterns and materials, and industrial-use robots have made progress as domestic user circles have shown a very positive stand toward induction of new systems and products.

In addition, there are new tasks which include the development of energy-saving forming machines and countermeasures to prevent labor accidents. By making progress in forming machine technology and coping with new tasks, it is believed that the industry will be able to assume an important role in the industries of many countries of the world.

Business Trends

The major forming machine builders are members of the Japan Metal Forming Machine Builders' Association. Over 100 companies are members of the Association.

Depending on the size of the forming machine products as well as diversity of the machines and large and small demand volume, the scale and structure of the makers have varied greatly. The makers range from super-large businesses such as shipbuilding and steel production to small companies with about 20 to 30 workers with each respective business carrying out production activities under its own technical know-how.

Since the forming machine industry is a capital goods industry which has a demand field covering the broad machinery industry, it is easy for its demand to receive major effects of business trends from time to time.

In recent years, our industry received a big blow during the so-called first oil shock in 1973. Since then, demand continued to rise smoothly until the production total reached a new high in 1980 amounting to about 190 billion yen in value (currently about 230 yen level to the dollar). A breakdown of the main products showed that about 14,000 press machines and 6,700 hydraulic presses were manufactured during the year. The 1981 production total is expected to exceed 200 billion yen.

The principal reason for production increase was attributed to rationalization investments in such industries as automobile and automotive parts, and electric machinery and equipment. In addition, there was large contribution by mechanical press investments in internally-equipped safety functions.

The scale of forming machine exports amounted to between 50 billion yen and 60 billion yen in 1980. The machines were exported mainly to the U.S. and Southeast Asian countries. The export trend showed that most of the large types such as plants were shipped to the U.S. and the socialist countries while the small and medium multi-purpose machines were exported to Southeast Asian countries.

The trend of forming machine imports is entirely subject to the domestic business situation, marking a sharp decrease during a recession.

FY 1980 imports (during the April 1980 to March 1981 period) registered about 12 billion yen or a continuing increase. Currently, major imported models include the high-speed forming machine and other speciality machines mainly from the U.S. and West Germany. Most of them are internationally well-known products.

Technical Trends

The contents of technical development which the forming machine industry has so far achieved can be broken down into the following three segments:

1) Improvement of high precision and reliance,
2) Higher productivity through high speed and automation.
3) Compliance with new needs accruing from the development of new technologies.

These three technical developments have ensued a variety of evolutions including high-speed and high-precision press, cold forging process, transfer press, automatic materials supply and automatic mold-changing systems.

In addition, our industry has taken positive steps recently toward environmental and labor safety measures which constitute one of the most important tasks among industrial circles.

Although many research institutes and industrial associations have been exercising a fundamental study for low-noise, low vibration measures, it appears necessary to continue a great deal of studies on an accumulating basis in the future before any economical and effective measures for low noise and low vibration can be attained.

During the past few years, safety measures for press machines have been pursued positively through Japanese Government regulations as well as subsidies and through the efforts of user industries.

In other words, a series of comprehensive safety measured aimed at the machinery industry as well as user circles are at present in progress.

They include the compulsory installation of safety measure press machines, the execution of model licensing systems for safety function-equipped presses, financial subsidies for the above installation cost and compulsory check of press machinery on regular basis.

The direction of the technical development of the Japanese forming machine industry is now heading can be divided into the following three:

1) Development of new metal plastic processing techniques,
2) Automation and multiple techniques for the purpose of multifarious production,
3) Development of energy conservation.

In addition to these three, it is predicted that measures against noise and vibration as well as measures for safety will remain a constant task in terms of future technical development.

In planning advanced forming machine production on the basis of the Law on Extraordinary Measures for Promotion of Specific Machinery and Information Industries through the Ministry of International Trade and Industry as a window organ, the machinery industry has been endeavoring to pursue research and development by establishing various tasks for development and industrialization of new products.

Major items among them include further industrialization of:

1) Index-controlled automatic forging equipment,
2) Index-controlled automatic free-type forging equipment,
3) Hydroforming press-type index-controlled forming machine.

The Japanese forming machine industry is constantly seeking new tasks and trying to resolve them by meeting all requirements accruing from prevailing economic conditions and user circles.

It is, therefore, expected that the industry will greatly contribute to the development of the industrial circles of the world in the future. ■

Production Trends by Machine Type (Unit: million yen)

Type \ Fiscal Year	1974	1975	1976	1977	1978	1979	1980
Bending machines	4,144	3,716	5,278	4,088	3,390	4,306	5,091
Hydraulic press	28,324	16,480	16,661	21,489	24,779	33,454	35,112
Mechanical press	58,419	33,040	53,906	68,468	71,394	96,089	109,827
Shearing machine	15,925	8,469	13,773	12,549	14,725	16,549	22,510
Hammer	1,164	1,642	1,037	1,349	1,872	1,343	1,417
Other forging machine	2,749	2,436	2,672	2,838	7,126	3,404	4,880
Wire forming machine	11,771	6,863	7,969	6,154	8,058	7,888	10,789
Total	122,496	72,646	101,296	116,935	131,344	163,033	189,626

Source: 'Machinery Statistics' (MITI)

Trends of Production & Exports and Imports (Unit: million yen)

Fiscal year beginning in April	Production		Exports		Imports	
	Unit	Value (A)	Value (B)	(B/A)	Value (C)	(C/A)
1969	23,218	76,459	6,878	9.0(%)	14,186	18.6
1970	24,664	87,512	9,226	10.5	14,095	16.1
1971	15,520	62,325	15,070	24.2	13,370	21.5
1972	21,972	72,177	16,372	22.7	7,173	9.9
1973	28,134	109,052	25,830	23.7	10,030	9.2
1974	20,283	122,496	32,460	26.5	15,778	12.9
1975	12,489	72,646	32,686	45.0	12,797	17.6
1976	16,720	101,196	39,504	39.0	7,444	7.4
1977	16,529	116,935	50,151	42.9	6,881	5.9
1978	19,755	131,344	50,358	38.3	6,004	4.6
1979	24,967	163,033	68,064	41.7	10,599	6.5
1980	29,110	189,626	60,953	32.1	11,656	6.1
1981 outlook	–	210,000	60,000	28.6	12,000	5.7

Source: 'Machinery Statistics' (MITI) Customs Clearance Statistics (MOF)

The List of Leading Metalworking Enterprises in Japan

AICHI TOKEI DENKI K.K.
1-2-70, Chitose, Atsuta-ku, Nagoya

AMADA COMPANY, LTD.
200, Ishida, Isehara City, Kanagawa Pref.

ASHINA IRON WORKS, LTD.
945, Hirotani-cho, Fuchu City, Hiroshima Pref.

AZUMA SHIMAMOTO ENGINEERING CO., LTD.
2-132, Momoyama-cho, Niigata City, Niigata Pref.

CITIZEN WATCH CO., LTD.
840, Shimotomi-takeno, Tokorozawa City,
Saitama Pref.

DAIDO MACHINERY, LTD.
9, Takiharu-cho, Minami-ku, Nagoya

DAINICHI KINZOKU KOGYO CO., LTD.
Shin Osaka Bldg., 1-1-36, Nishi Awaji-cho, Higashi
Yodogawa-ku, Osaka

DAIWA SEIKI CO., LTD.
1-270, Higashi Onari-cho, Omiya City, Saitama Pref.

EGURO MACHINERY CO., LTD.
8-14, Okura-machi, Okaya City, Nagano Pref.

ENSHU LTD.
4888, Takatsuka, Kami-mura, Hamana-gun, Shizuoka
Pref.

FUJI MACHINE MFG. CO., LTD.
19, Chausuyama, Yama-machi, Chiryu City, Aichi
Pref.

FUJI SEIKI CO., LTD.
981, Ueflonishiwaki, Ageo City, Saitama Pref.

FUJI-SEIKI MACHINE WORKS, LTD.
840, Shimotogari, Nagaizumi-cho, Sunto-gun,
Shizuoka Pref.

FUJITSU FANUC LTD.
3-5-1, Asahigaoka, Hino City, Tokyo

HAMAI CO., LTD.
5-5-15, Nishi Gotanda, Shinagawa-ku, Tokyo

HAYAKAWA MACHINERY WORKS, LTD.
32-56, Nagane, Daikoji, Chita City, Aichi Pref.

HITACHI SEIKI CO., LTD.
1, Abiko, Abiko City, Chiba Pref.

HITACHI SEIKO LTD.
890, Kashimada, Saiwai-ku, Kawasaki City,
Kanagawa Pref.

HOKOKU MACHINERY CO., LTD.
1008, Kusado-cho, Fukuyama City, Hiroshima Pref.

HOMMA METAL WORKS CO., LTD.
3-7-2, Tagawa, Yodogawa-ku, Osaka

HORI MACHINE TOOL CO., LTD.
3-8-12, Oshiage, Sumida-ku, Tokyo

HOWA MACHINERY, LTD.
Sukaguchi, Shinkawa-cho, Nishikasugai-gun,
Aichi Pref.

ICHIKAWA GRINDER MFG. CO., LTD.
283, Michishita, Kagiage Shinden, Iwatsuki City,
Saitama Pref.

IIDA MACHINERY CO., LTD.
2-15-14, Mishuku, Setagaya-ku, Tokyo

IKEDA IRON WORKS, LTD.
3-6-23, Nishi Gotanda, Shinagawa-ku, Tokyo

IKEGAI IRON WORKS, LTD.
4-1-21, Shiba, Minato-ku, Tokyo

ITO SEISAKUSHO CO., LTD.
6-4-11, Nishi Oi, Shinagawa-ku, Tokyo

JAPAN ABRASIVE CUTTING MACHINE MFG. CO., LTD.
Oyamazaki-cho, Otokuni-gun, Kyoto

JAPAX INC.
100, Sakato, Takatsu-ku, Kawasaki City,
Kanagawa Pref.

KANZAKI KOKYUKOKI MFG. CO., LTD.
341, Inadera, Amagasaki City, Hyogo Pref.

KARATSU IRON WORKS, LTD.
Marunouchi Bldg., 2-4-1 Marunouchi, Chiyoda-ku,
Tokyo

KASHIFUJI WORKS, LTD.
28, Kamota, Kamitoba, Minami-ku, Kyoto

KATAOKA MACHINE TOOLS MFG. CO., LTD.
7-1, Kyogamine, Miyai-cho, Okazaki City, Aichi Pref.

KEIYO SEIKI CO., LTD.
2-377-3, Katsushika-cho, Funabashi City, Chiba Pref.

KITAGAWA IRON WORKS CO., LTD.
77-1, Moto-machi, Fuchu City, Hiroshima Pref.

KITAGAWA KOGYO CO., LTD.
11-1, Moto-machi, Fuchu City, Hiroshima Pref.

KITAMURA MACHINERY CO., LTD.
1870, Toide-cho, Takaoka City, Toyama Pref.

KOMATSU LTD.
2-3-6, Akasaka, Minato-ku, Tokyo

KONDO MACHINE WORKS, CO., LTD.
91, Nakanotsubo, Hanada-cho, Toyohashi City,
Aichi Pref.

KOTOBUKI INDUSTRY CO., LTD.
2, Minami Matsuda-cho, Higashi Kujo, Minami-ku,
Kyoto

KOYO MACHINE INDUSTRIES CO., LTD.
2-34, Minami Uematsu-cho, Yao City, Osaka

KURASHIKI MACHINERY CO., LTD.
Shinko Bldg., 2-1, Kanda Ta-cho, Chiyoda-ku, Tokyo

MAKINO MILLING MACHINE CO., LTD.
2-3-19, Nakane, Meguro-ku, Tokyo

MARUFUKU MACHINERY WORKS, CO., LTD.
2-1-9, Itachibori, Nishi-ku, Osaka

MATSUURA MACHINERY CORP.
1, Azanuma, Urushihara, Fukui City, Fukui Pref.

MITSUBISHI ELECTRIC CORP.
2-2-3, Marunouchi, Chiyoda-ku, Tokyo

MITSUBISHI HEAVY INDUSTRIES, LTD.
2-5-1, Marunouchi, Chiyoda-ku, Tokyo

MITSUI SEIKI KOGYO CO., LTD.
3-3-7, Nihonbashi Muro-machi, Chuo-ku, Tokyo

MIYANO MACHINERY CO., LTD.
1000, Akiwa, Ueda City, Nagano Pref.

MOTOKUBO MACHINE TOOL WORKS, CO., LTD.
73, Seto-cho, Fukuyama City, Hiroshima Pref.

MURATA MACHINERY, LTD.
3, Minami Ochiai-cho, Kisshoin, Minami-ku, Kyoto

NACHI-FUJIKOSHI CORP.
20, Ishigane, Toyama City, Toyama Pref.

NAKAMURA TOME PRECISION INDUSTRY CO., LTD.
15, Netsuno, Tsurugi-machi, Ishikawa Pref.

NICCO MACHINE TOOL CO., LTD.
1-26-21, Tamagawa, Ota-ku, Tokyo

NIHON DIA INDUSTRY CO., LTD.
1-1-2, Kasuya, Setagaya-ku, Tokyo

NIHON KIKAI SEISAKUSHO CO., LTD.
2-1-1, Matsuba, Nagaoka City, Niigata Pref.

NIIGATA ENGINEERING CO., LTD.
1-4-1, Kasumigaseki, Chiyoda-ku, Tokyo

NIPPEI INDUSTRIAL CO., LTD.
World Trade Center Bldg., 2-4-1,
Hamamatsu-cho, Minato-ku, Tokyo

NISSIN MACHINE WORKS CO., LTD.
300, Aritama Nishi-machi, Hamamatsu
City, Shizuoka Pref.

NOMURA AUTOMATIC LATHE CO.
437, Tanzawa, Okutama-machi,
Nishitama-gun, Tokyo

NOMURA MACHINE TOOL WORKS, LTD.
1-2-37, Nishi Kagaya, Suminoe-ku, Osaka

OGAKI IRON WORKS, CO., LTD.
480, Tsurumi-cho, Ogaki City, Gifu Pref.

OGAWA IRON WORKS, LTD.
472-1, Omachi, Yasufuruichi-machi,
Hiroshima City, Hiroshima Pref.

OHMIYA MACHINERY CO., LTD.
1-404-5, Yoshino Hara-machi, Omiya City,
Saitama Pref.

OKAMOTO MACHINE TOOL WORKS, LTD.
1000, Minowa-cho, Kohoku-ku, Yokohama

OKAMURA IRON WORKS CO., LTD.
3-2-16, Shiroka, Nagaoka City, Niigata Pref.

OKUMA & HOWA MACHINERY LTD.
1111, Maeno, Konan City, Aichi Pref.

OKUMA MACHINERY WORKS, LTD.
1-32, Tsuji-machi, Kita-ku, Nagoya

O.M. LTD.
Umeda Bldg., 1-12-17, Umeda, Kita-ku, Osaka

OOYA MACHINERY WORKS, CO., LTD.
1-8, Tota-cho, Moriguchi City, Osaka

OSAKA KIKO CO., LTD.
8-10, Kita Itami, Itami City, Osaka

RIKEN SEIKO CO., LTD.
Toranomon Bldg., 1-1-12, Toranomon, Minato-ku,
Tokyo

ROKU-ROKU SANGYO, LTD.
4-23-5, Takanawa, Minato-ku, Tokyo

SAKURAI, LTD.
830, Sukenobu-cho, Hamamatsu City, Shizuoka Pref.

SANJO MACHINE WORKS, LTD.
1300, Inokoba Shinden, Sakae-mura, Minami
Kanbara-gun, Niigata Pref.

SANKYO SEIKI MFG. CO., LTD.
5329, Shimo Suwa-cho, Suwa-gun, Nagano Pref.

SANSEI MFG. CO., LTD.
200, Isehara City, Kanagawa Pref.

SANYO MACHINE WORKS, LTD.
1, Oka, Okimura, Nishiharu-cho,
Nishikasugai-gun, Aichi Pref.

SEIBU ELECTRIC MFG. CO., LTD.
868, Kubo, Koga-machi, Kasuya-gun, Fukuoka Pref.

SEIKO SEIKI CO., LTD.
4-3-1, Yashiki, Narashino City, Chiba Pref.

SEIWA IRON WORKS LTD.
4-8-13, Sanwa-cho, Toyonaka City, Osaka

SHIGIYA MACHINERY WORKS, LTD.
6-1, Nishikashima-cho, Fukuyama City, Hiroshima
Pref.

SHIN NIPPON KOKI CO., LTD.
2-44, Kita Kyuhoji-machi, Higashi-ku, Osaka

SHIZUOKA MACHINE TOOL CO., LTD.
9-52, Toyohara-cho, Shizuoka City,
Shizuoka Pref.

SHOUN MACHINE TOOL CO., LTD.
2-1-1, Mikuni, Toyonaka City, Osaka

SUGA MACHINE TOOL CO., LTD.
3-2-11, Sumiyoshi-cho, Anjo City, Aichi Pref.

SUGIMOTO TEKKO, CO., LTD.
2-69, Honjo Nishi, Higashi-Osaka City, Osaka

STAR MFG. CO., LTD.
365, Sena, Shizuoka City, Shizuoka Pref.

TAIYO SEIKI CO., LTD.
3, Funatsu, Kashiwase, Komaki City, Aichi Pref.

TAKISAWA MACHINE TOOL CO., LTD.
983, Natsukawa, Okayama City, Okayama Pref.

TEIJIN SEIKI CO., LTD.
Higobashi Center Bldg., 1-9-1, Edobori, Nishi-ku,
Osaka

TOKYO KIKAI SEISAKUSHO, LTD.
5-26-24, Shiba, Minato-ku, Tokyo

TOSHIBA MACHINE CO., LTD.
4-12-11, Ginza, Chuo-ku, Tokyo

TOYAMA MACHINE WORKS, LTD.
100, Fukuno-machi, Higashi Tonami-gun, Toyama
Pref.

TOYODA MACHINE WORKS, LTD.
1-1, Asahi-machi, Kariya City, Aichi Pref.

URAWA MACHINE TOOLS CO., LTD.
10-16-26, Tokiwa, Urawa City, Saitama Pref.

TOYO KOGYO CO., LTD.
3-1, Shinchi, Fuchu-machi, Aki-gun, Hiroshima Pref.

TOYOOKI KOGYO CO., LTD.
45, Kaizan, Hatchi-cho, Okazaki City, Aichi Pref.

TOYO SEIKI CO., LTD.
341, Kofukasaku, Omiya City, Saitama Pref.

TOYO SEIKI KOGYO CO., LTD.
2715, Miyagawa, Chino City, Nagano Pref.

TSUGAMI CORP.
1-18-16, Shinbashi, Minato-ku, Tokyo

TSUNE SEIKI CO., LTD.
852, Takahizuki, Fuchu-machi, Nehi-gun,
Toyama Pref.

URAWA MACHINE TOOLS MFG. CO., LTD.
10-16-26, Tokiwa, Urawa City, Saitama Pref.

WAIDA MFG. LTD.
1-100, Showa-cho, Takayama City, Gifu Pref.

WASINO MACHINE CO., LTD.
1080, Obarimi-Shinden, Komaki City, Aichi Pref.

YAMADA KOKI CO., LTD.
2-5-16, Minami Azabu, Minato-ku, Tokyo

YAMAGE IRON WORKS CO., LTD.
54-2-13, Shimoemori-cho, Fukui City, Fukui Pref.

YAMASAKI GIKEN CO., LTD.
1147, Kanda, Kochi City, Kochi Pref.

YAMAZAKI MACHINERY WORKS, LTD.
1, Norifune, Oguchi-cho, Niwa-gun, Aichi Pref.

YASUDA INDUSTRY CO., LTD.
1160, Hamanaka, Satosho-cho, Asaguchi-gun,
Okayama Pref.

YASKAWA ELECTRIC MFG. CO., LTD.
Ohtemachi Bldg., 1-6-1, Ohtemachi,
Chiyoda-ku, Tokyo

YONEDA TEKKOSHO, LTD.
1-7-10, Toyoshima Minami, Ikeda City, Osaka

YUTAKA SEIMITSU KOGYO, LTD.
592, Kami Ochiai, Yono City, Saitama Pref.

CSO: 4120/74

KEY PRODUCTS OF MACHINE TOOL MANUFACTURERS

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981 pp 44-78

[Text] Machining Center

Model VMC 7040
Machining Center

Enshu Limited

The VMC-7040 Vertical Machining Center is designed and built on the background of both high technology and excellent workmanship.

Specifications (Mechanical Portion)

Spindle drive motor	DC 3.7 kw constant 55 kw intermittent
Spindle speed range	50 – 3,150 rpm
Table size (working surface)	1,000 x 400 mm
Table T-slots	five 18 wide T-slots every 80 spacings
Table longitudinal travel (X axis)	700 mm
Saddle cross travel (Y axis)	400 mm
Head vertical travel (Z axis)	500 mm
Spindle nose to table top distance	125 – 625 mm
Spindle center to column ways	450 mm
Spindle taper	No. 40
Rapid traverse rate:	
X & Y axes	12,000 mm/min.
Z axis	10,000 mm/min.
Feed range:	
X & Y axes	1 – 2,000 mm/min.
Z axis	1 – 2,000 mm/min.
Maximum weight of workpiece	500 kgf
Machine weight	3,800 kgf
Floor space	2,825 (W) x 2,795 (L) mm
Machine total height	2,640 mm
ATC:	

tool number	25
tool selection	random
took shank	MAS 403-BT 40
max. tool dia. x length	ϕ 75 (ϕ145) mm x 300 mm
max. tool weight	8 kgf

Features

The VMC-7040 Vertical Machining Center is designed for the purpose of getting high productivity and easy handling as well as wide versatility in use, besides it is of high accuracy and reliability. The VMC-7040 has several advanced functions in the standard specifications such as rapid travel speed of 12 m/min., high speed tool change time of 5 seconds, etc., and gives high productivity. The VMC-7040 is easily operated by the unskilled worker thanks to "CRT character display" on the control panel and operation switches arranged systematically on the panel. If trouble should happen, the cause is found immediately by the self diagnosis. The VMC-7040 Vertical Machining Center is most suitable for the facilities for the factory of today.

Machining Capacity

Milling capacity:

(by ϕ 100 mm face mill) 80 Cu. cm/min. in Steel, 100 Cu. cm/min. in Cast Iron.

(by HSS ϕ 20 mm end mill) 40 Cu. cm/min. in Steel, 75 Cu. cm/min. in Cast Iron.

Drilling capacity: ϕ45 in Mild Steel

Accuracy

Positioning accuracy: 0.005 mm/300 mm

Repeatability: ±0.002 mm (each axis)

High Performance

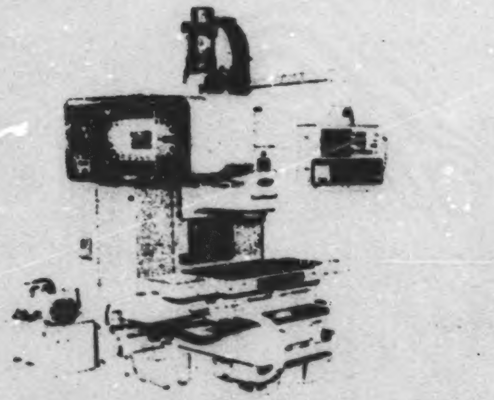
Tool change: 5 seconds

Magazine Capacity: 25 tools

Rapid travel: 12 m/min.

Updatable Design

Draft of Ultra High Precision Spindle



Standard Accessories for ENSHU/FANUC System 6M

Controlled axes: 3 axes (X, Y, and Z). Simultaneously controlled axes: 3 axes. System resolution: 0.001 mm. Keyboard manual data input (MDI). CRT character display. Decimal point programming. Selective absolute/incremental programming within the same block of data. Programming of absolute coordinate zero. Positioning, linear and circular interpolations across different quadrants. Buffer storage. Dwell. Cutter compensation C: +6 digits, G40, G41, G42.

Tool length offset: +6 digits, G45 – G48 (up to 32 sets in total of cutter compensation C and tool length offset values). Manual pulse generator. Dry run. Self diagnostics. Backlash compensation. Single block. Optional block skip. Machine lock. 4-digit sequence number display. Sequence number search. Program number search. Manual/automatic return to reference point. Canned cycle (G80 thru G89). Constant tangential feedrate control. Mirror image: with respect to X and Y axes. Tape reader. Part program storage and editing: 15 m of tape information. Stored pitch error compensation. Rapid traverse override.

Milling Machine–Model 3VN
Machining Center–Model 3VA
Copy Milling Machine–Model 3VT

Hamai Co., Ltd.

- We have the following 3 models:
  CNC Milling Machine, Model 3VN
  CNC Machining Center, Model 3VA
  NC Copy Milling Machine, Model 3VT
  Models 3VA and 3VT have been developed based on Model 3VN, namely 3VA is equipped with ATC and 3VT with Tracer head. Customers can therefore select any one of the above three models according to their purposes.
- Each of Models 3VN and 3VA has a standard spindle head in which contains 2-steps speed change gearing unit. If however high speed operation is required, a high speed type head is available as an optional specification.
- All the three models can be equipped with OILMATIC spindle cooling device so as to make it possible to operate each machine in high speed and in high accuracy.
- Model 3VN is provided with hydraulic unit as the standard execution, which makes it possible to fit pull studs on tools and to clamp and unclamp tools by operating a push button.
- Spindle head of Model 3VT is designed to make quill movable vertically by 100 mm so that easy copying operation can be done.
- For easy maintenance, Model 3VT is equipped with FANUC 330D control and FANUC Tracer head.

Specifications

Specification	CNC Milling Machine 3VN	CNC Machining Center 3VA	NC Copy Milling Machine 3VT
TABLE			
Table surface	1100 mm x 470 mm (43.3" x 18.5")		
Working surface	1100 mm x 400 mm (43.3" x 15.7")		
Max. weight of workpiece	500 kgs (1100 lb)		
T-slot	4 mm – 18 mm (4" – 0.7")		
TRAVEL			
Longitudinal (X)	750 mm (29.5")		
Cross (Y)	400 mm (15.7")		
Vertical (Z)	450 mm (17.7")		
Spindle nose to table top	150 mm – 600 mm (5.9" – 23.6")		50–600mm (2" – 23.6")
Column surface to table top	450 mm (17.7")		
FEED RATE			
Rapid feed (X/Y)	12,000 mm/min (472")		10,000 mm/min (394")
Rapid feed (Z)	10,000 mm/min (394")		
Feed	1 – 3,000 mm/min (0.01–120")		1-2,000mm/min(0.01-80")
Feedback	Pulse Encoder		Resolver
Least input	0.001 (0.000.1)		
MOTOR			
Axis Feed (X/Y)	DC 0.8 Kw (1 HP)		
Axis Feed (Z)	DC 1.1 Kw (1.5 HP)		
Coolant	AC 0.25 Kw (0.4 HP)		
Lubricant	AC 4 W (0.005 HP)		
Spindle Cooling	AC 0.6 Kw (0.8 HP)		
Hydraulic	AC 1.5 Kw (2 HP)		
DIMENSION			
Floor space	2600 mm x 2455 mm (102.4" x 96.7")		
Height	2660 mm (104.7")		
DIM.			
Machine weight	3800 kgs (8400 lb)	4300 kgs (9500 lb)	4100 kgs (9000 lb)
Power supply	200/220V, +10% –15%, 3-Phase, 50% Hz, 17 KVA		
FANUC NC Unit	F-6M		F-330D

Head Model

Specification	5G	8B	5GQ
Spindle nose	NT 40. (ISO TAPER 7/24)		
Tooling	MAS-BT40 with Pull Stud (MAS-P40 T-I)		Manual
Tool clamp	Hydraulic		Manual
Spindle speeds	20 – 5000 rpm	100 – 8000 rpm	20 – 5000 rpm
Spindle function	S-4 Digit Direct Programing		Volume change
Spindle motor	AC 5.5 Kw (7.5 HP) 30 min.		
Quill stroke			100 mm
Tracer head			Vertical*
Machine model	3 VN 3 VA	3 VN 3 VA	3 VT

* (FANUC MADE)

Automatic Tool Changer

Capacity of tool	24 tools
Tool selection	Memory random
Tool change time	5 sec
Chip to chip	Approx. 15 sec
Max. tool dia.	80 mm
Max. tool length	300 mm
Max. tool weight	7 kg

Machine Accessories (Standard)

Electric spindle orientation, Trouble diagnosing function, Hydraulic unit, Load meter.

(Options)

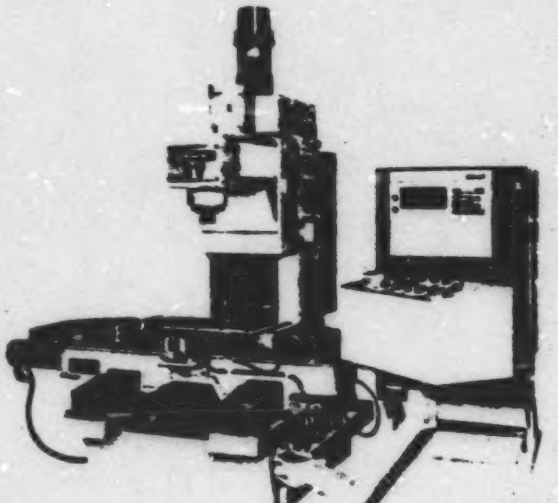
Flood coolant system, Spindle cooling device, Splash guard, Screw chip conveyer, Indexing table used with additional axis, Inductosyn feed back.

NC Unit (FANUC 6M) (Standard)

Simultaneous controllable axes: 3 axes, Spindle speed function: S4 digits, direct designation, Fixed cycle, Stored pitch error compensation, Part program storage and editing: 40m (130ft) of tape information, Tape punch interface, Inch/metric conversion, Door interlock.

(Options)

Tape reader with reels, Manual pulse generator, Additional 4th axis, Cutter compensation C, Part program storage and deiting: 40/80/320m (130/264/1056ft) of tape information, Helical interpolation, Character display unit.



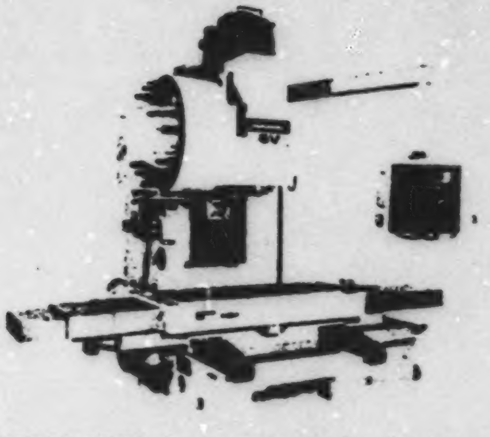
MC-3V

MC Series 5V-6V
Vertical Machining Center

Hamai Co., Ltd.

Features

- Rigid Bed type construction gives the machine the long durability in high accuracy. Also, no overhang exists on all strokes X, Y, Z, and this makes heavy cut in wide range possible.
- Special consideration has been made for the front design in order to make operation easier. Excellent accessibility makes operation efficient.
- Slide surface is provided with cover which protects the machine perfectly from oil and chips. Screw conveyor (6V only) can be supplied optionally.
- The machine has large space table, 1-ton loading capacity and 1-ton Z axis thrust force, enabling to perform machining of large size workpiece and drilling of large diameters.
- Main spindle is driven by a large horse power motor, DC 11 Kw (30 min rating).
  Specially, MC-6V is equipped with 3-step speed change facility, and this makes the machine work for wider speed range from low to high in full power.
- Feed motors for each axis can be fitted on outside machine to ensure easy maintenance. These motors are excellent in heat radiation, therefore these do not affect machining accuracy.
- Main spindle orientation is of electric system. This allows quick movement and trouble-free. Heat pipe is used for main motor so as to keep the motor from overheated.



CONTROL UNIT is mounted outside of column. It is therefore easy to move and fix the unit, and furthermore floor space can be saved to the minimum.

NC UNIT has programming controller, which makes change of machine function and ATC sequence after delivery possible.

OPERATION PANEL is pendant type located in front of the machine. All push buttons, key lamp displays, etc. necessary for machine operation are accommodated in the panel.

Main Specification for MC Series (5V, 6V)

	Specification	Unit	MC-5V	MC-6V
TABLE	Working surface	mm	500×1,500 (19.7×59")	700×2,000 (27.6×78.7")
	Maximum weight of workpiece	kgs	3,000 (6,600 lbs)	4,000 (8,800 lbs)
		mm	18×5 (0.7"×5)	18×7 (0.7"×7)
TRAVEL	Longitudinal travel of table (X)	mm	1,100 (43.3")	1,250 (49.2")
	Cross travel of column (Y)	mm	700 (27.6")	900 (35.4")
	Vertical travel of spindle head (Z)	mm	500 (19.7")	700 (27.6")
	Distance from spindle nose to table top	mm	200~700 (7.9~27.6")	250~900 (9.8~35.4")
SPINDLE	Spindle nose		ISO R297/ Taper No.50	ISO R297/ Taper No.50
	Spindle speeds	rpm	30~2,240 (standard) 15~3,150 (option)	30~2,240 (standard)
	Distance from spindle center to column surface	mm	600 (23.6")	800 (31.5")
FEED RATE	Rapid feed	mm/min	10,000 (400 ipm)	10,000 (400 ipm)
	Feed	mm/min	1~3,600 (0.04~141.7 ipm)	1~3,600 (0.04~141.7 ipm)
	Feedback		Resolver	Resolver
	Least input increment	mm	0.001 (0.00004")	0.001 (0.00004")
MOTOR	Spindle motor	kw	DC 11 (15HP/30 min.)	DC 15 (20HP/30 min.)
	Axis feed	kw	1.8 (×3)	2.8 (×3)
WEIGHT		kgs	12,500 (27,500 lbs)	15,000 (33,000 lbs)
AUTOMATIC TOOL CHANGER	Capacity of tool magazine	tools	20	20
	Tool selection		Random selection	Random selection
	Tool change time	sec	[illegible]	[illegible]

Machine Accessories (Standard)
Electric spindle orientation, Trouble diagnosing function, Fan cooler for main spindle, Hydraulic unit, Load meter.
(Options)
Flood coolant system, Spindle cooling device, Splash guard, Screw chip conveyer, Magazine for 24 tools (5V only), Indexing table used with additional axis, Inductosyn feed back.

NC Unit (FANUC 6M) (Standard)
Simultaneous controllable axes: 3 axes, Spindle speed function: S4 digits, direct designation, Fixed Cycle (G73, G74, G76, G80–89), Stored pitch error compensation, Part program storage and editing: 15m (49ft) of tape information, Tape punch interface, Inch/metric conversion, Door interlock.
(Options)
Tape reader with reels, Manual pulse generator, Additional 4th axis, Cutter compensation C, Part program storage and deiting: 40/80/320m (130/264/1056ft) of tape information, Helical interpolation, Character display unit.

MC-50V, 70V, 80V
Vertical Machining Center

Hamai Co., Ltd.

Column [illegible] [illegible]sign:

These new Machining Centers have been developed after years of experience in manufacturing a range of production milling machines supplied to the automobile industries. The column feed construciton is the most advanced engineering concept in machining center design providing for superior machine balance and exceptional rigidity resulting in high precision performance over extended periods of time.

Workpiece Loading and Unloading:

The generously proportioned travel movements in all axes in addition to the large table area will cut loading and unloading time to a minimum. The flat design of the front surface of the table bed will allow for maximum crane access to the machine loading and unloading area.

Massive Slideway Surface:

All machine slideway surfaces provide sufficient bearing width. This massive construction insures the accommodation of heavy workpieces and heavy cutting loads, without sacrificing precision. The Y and Z axis slideway surfaces are manufactured of hardened and ground steel plate and the X axis surface is of hardened and ground meehanite casting. Smooth and continuous no-bind motion of sliding members is assured through the use of Turcite B where metal to metal contact might normally be an impediment to member movement.

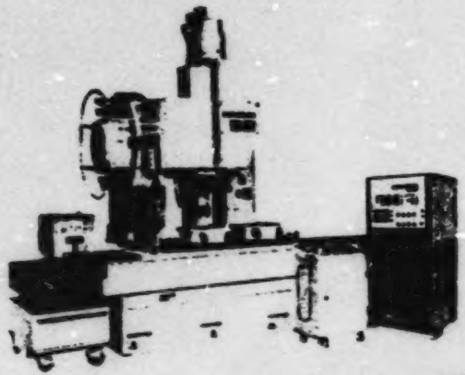
Slideway Lubrication System:

Hamai engineers have designed an exceptionally reliable piston-type distributor using steel conduit piping to provide for fail-safe slideway lubrication. In addition, they have installed a safety alarm lamp to alert the operator in the remote event that there is a lubrication malfunction.

Automatic Tool Changer:

The 20 tool automatic tool changer provides for random tool selection and is mounted on the side of the machine precluding the possibility of interference in the machine operation. The tool changing technique used is extremely efficient and tool change time is rated at 5 sec. Tool pots will accommodate maximum diameters of 150 mm (6"), a maximum tool length of 350mm (13.8") and maximum tool weight of 15 kgs (33lbs).

Rugged Spindle Construction:



MC-50V

Each machine is provided with a spindle having sufficient diameter, which is supported by a doule row cylindrical roller bearing in addition to a double row angular thrust bearing. The massive proportioned spindle coupled with the support bearing positioning, insures maximum machining efficiency and high precision under the most adverse cutting conditions.

Spindle Head Lubrication and Cooling:

An outside forced lubrication system is used in conjunction with a cooling fan to maintain the spindle head at a constant temperature of +7°C (44.6°F). For special continued cutting at high speeds Hamai offers an optional unit to provide constant spindle head temperature at ±2°C (35.8°F). This feature will provide for continued high speed accuracy without the risk of thermal distortion.

Hamai Co., Ltd. manufactures all types of vertical machining centers ranging from small to large sized ones.

Machine Accessories (Standard)

Trouble diagnosing function, Fan cooler for main spindle,

Machine Specification for MC Series (50V, 70V, 80V)

	Specification	Unit	MC-50V	MC-70V	MC-80V
TABLE	Working surface	mm	500X1,680 (19.7X66")	700X2,000 (27.6X78.7")	800X2,250 (31.5X88.6")
	Maximum weight of workpiece	kgs	3,000 (6,600lbs)	4,000 (8,800 lbs)	6,000 (13,200 lbs)
		mm	18X5 (0.7"X5)	18X7 (0.7"X7)	22X5 (0.9"X5)
TRAVEL	Longitudinal travel of table (X)	mm	1,100 (43.3")	1,250 (49.2")	1,600 (63")
	Cross travel of column (Y)	mm	700 (27.6")	900 (35.4")	1,000 (39.4")
	Vertical travel of spindle head (Z)	mm	500 (19.7")	700 (27.6")	800 (31.5")
	Distance from spindle nose to table top	mm	200~700 (7.9~27.6")	250~900 (9.8~35.4")	250~1,050 (9.8~41.3")
SPINDLE	Spindle nose		ISO R297/ Taper No.50	ISO R297/ Taper No.50	ISO R297/ Taper No.50
	Spindle speeds	rpm	30~2,240 (stepless) 19~3,150 (option)	30~2,240 (stepless)	30~2,240 (stepless)
	Distance from spindle center to column surface	mm	600 (23.6")	800 (31.5")	900 (35.4")
FEED RATE	Rapid feed	mm/min	10,000 (400 ipm)	10,000 (400 ipm)	6,000 (240 ipm)
	Feed	mm/min	1~3,600 (0.04~141.7 ipm)	1~3,600 (0.04~141.7 ipm)	1~3,600 (0.04~141.7 ipm)
	Feedback		Resolver	Resolver	Resolver
	Least input increment	mm	0.001 (0.00004")	0.001 (0.00004")	0.001 (0.00004")
MOTOR	Spindle motor	kw	DC11 (15HP)30 min.	DC15 (20HP)30min.	DC18.5(25HP)30min.
	Axis feed	kw	1.7kwX3	2.8kwX3	2.8kwX3
WEIGHT		kgs	12,500(27,500 lbs)	15,000(33,000 lbs)	20,000(44,200 lbs)
AUTOMATIC TOOL CHANGER	Capacity of tool magazine	tools	20	20	20
	Tool selection		Random selection	Random selection	Random selection
	Tool change time	sec	5	5	5

Hydraulic unit, Load meter.

(Options)

Flood coolant system, Spindle cooling device, Splash guard, Screw chip conveyer, Magazine for 24 tools, Long tables & extension of table travel, Indexing table used with additional axis. Inductosyn feed back, Automatic workpiece changer.

NC Unit (FANUC 6M) (Standard)

Simultaneous controllable axes: 3 axes, Spindle speed function: S4 digits, direct designation, Fixed cycle (G73, G74, G76, G80–89), Feed function: F-1 digit feed rate, Stored pitch error compensation, Tape reader with reels, Part program storage and editing: 40m(130ft) of tape information, Tape punch interface, Manual pulse generator, Inch/metric conversion, Door interlock

(Options)

Additional 4th axis, Cutter compensation C, Part program storage and deiting: 80/320m (264/1056ft) of tape information, Helical interpolation, Character display unit.

MACCMATIC-610V

Vertical Machining Center

NC Built-in Type

Hitachi Seiko, Ltd.

Features

Easy Access to the Table

Bed type, column crosswise travelling design ensures excellent maneuverability and easy access to the machine. Because of no protrusion in front of the table, the workpiece can be mounted and removed very easily: and centering is facilitated.

Pendent Type Concentrated Operating Panel

All the controls are put on the pendent-type operating panel and are arranged properly from the viewpoint of human engineering.

One Travelling Unit in Each Axis

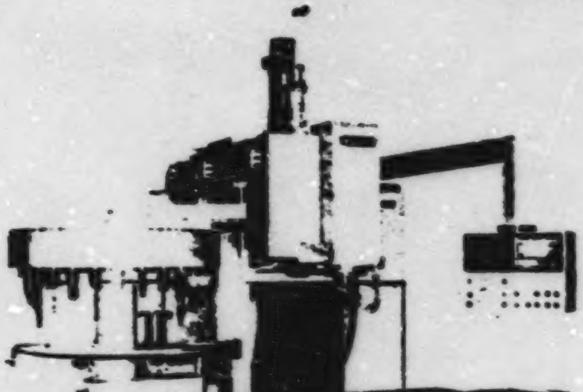
The table moves longitudinally, the column crosswise and spindle head in vertical direction. During travel in crosswise and vertical direction no weight is displaced and the friction conditions on the ways do not change. Thus, high accuracy can be kept for long time. Positioning accuracy is ± 0.010/300mm. (± 0.0004/12")

Micro-Computer Processed Interface

Sequence controllers are integrated into large-size IC design PCB. The use of micro-computer for machine interface enables electrical circuit without conventional contacts, thereby establishing reliability for a long period of time and enhancing performance.

Specifications

TABLE AND RANGE	
Working surface	1,400 x 550 mm
X axis travel	1,000 mm
Y axis travel	600 mm
Z axis travel	550 mm
Table to spindle end.	200 – 750 mm
Max. loading on table	1,000 kg
SPINDLE	
Main motor	11 KWAC (30 min rating) 15 HP
Taper	NT No. 45
Spindle speeds	32 – 4,000 rpm
AUTOMATIC TOOL CHANGER	
Number of tools	30 tools
Tool shank	CT Frange No. 45
Selection	Random
Machine weight (w/out N/C)	7,500 kg



Model MH-400

CNC Ram Type Horizontal Machining Center

Kurashiki Machinery Co., Ltd.

Spindle Operation

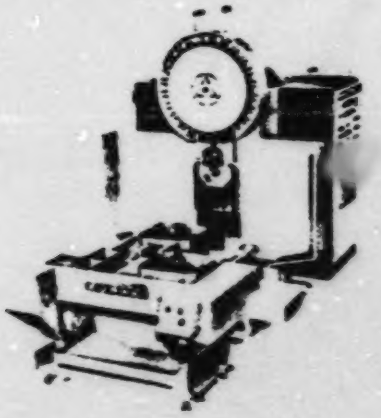
- Machine Body: The built-in control unit adds convenience and neat appearance to the machine.
- Ram Type Construction: The ram type spindle axis increases rigidity and makes heavier milling operations possible.
- Spindle Speed: Speed can be selected by one RPM increment throughout full range.
- Auto Pallet Changer: The Auto Pallet Changer is compact, accurate and simple to operate.

High Reliability

- Adoption of IC: The reliability of the NC unit has been increased by adopting IC in the sequence relay circuit.
- Precise Table Index: The curvic coupling type indexing system (5 degree increments) adds precision and reliability.
- Automatic Tool Changer: This ATC has no change arm but is simply constructed for rapid changes. (Change time 4.5 secs. for consecutive tools).

Good Productivity

- Check Function: Down time can be minimized by use of the input-output check function.
- Tool Selection: Tools can be selected at random by means of the address T and 2 digits.
- Tool Storage: The machine has a 24 station automatic tool changer.
- Fast Reverse Spindle: Tapping time is minimized with the quick exchange function. (Forward, Stop, and Spindle reverse)



Specifications

Stroke:

Table longitudinal travel (X)	600 mm
Ram vertical travel (Y)	400 mm
Distance between spindle center and table surface	50 – 450 mm
Ram travel (Z)	300 mm
Distance between spindle end and table center	200 – 500 mm

Model KV-1000

CNC Vertical Machining Center

Kurashiki Machinery Co., Ltd.

- Minimum Space Requirements by the Built-in Control Unit

  The hydraulic unit and the electrical equipment consisting of the NC equipment, electrical control panel, etc. are installed on the side and the rear of the machine to attain the built-in control unit, so that the required floor space has been minimized to make it easy to move and install.

- Pendant Control Designed for Operation Convenience and Efficiency

  The portions of the equipment related to the operation of the machinery and the NC operation, such as push buttons and indication lamps are concentrated on a pendant control panel so that the most of all operations can be conducted from the front of the machine and the operator does not need to move around here and there, thereby they can make it very efficient in operation.

- A Wide Table and Large Depth of Machining Area

  In comparison with other similar sized machining centers, the table width and the depth of the machining area are larger, so being more suitable for the machining of mould.

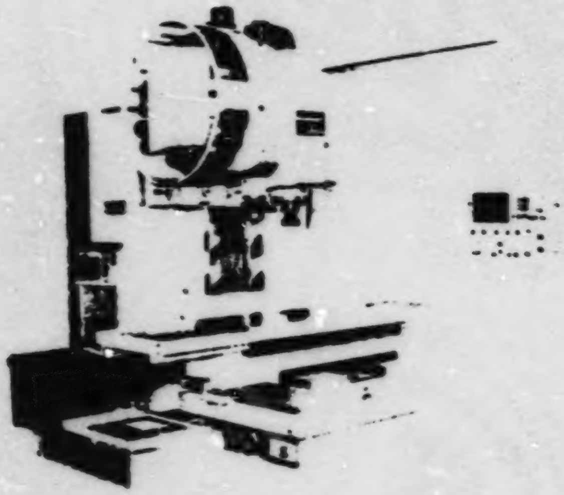
- Superior Performance of the Spindle

  The maximum revolutions of the spindle for the KV-700 at 5000 rpm and the KV-1000 at 3100 rpm are quite a lot, making possible a very high degree of efficiency and precision machining. These characteristics become most apparent in the machining of aluminum material.

Specifications

Table

Working surface	1400 x 550 mm
Longitudinal travel (X)	1050 mm
Cross travel (Y)	550 mm



Machining Center
Model MC65

Makino Milling Machine Co., Ltd.

The MC65 is designed to deliver utmost productivity and peak accuracy at the same time.

Makino invites you to take a long, hard look at the MC65 Horizontal Machining Center and a long, hard look at the many advantages it can bring to your operations – including a cost efficient initial investment. A product of Makino's proven metalworking technology, the MC65 is right on target in machining the parts size range turned out most frequently, in upgrading productivity and helping you to realize an unmanned and flexible manufacturing system.

- With high power for versatile machining
  - Extended nose 100 mm dia spindle is powered by a heavy-duty 7.5kW DC motor.
  - Spindle speed range from 10 to 4000 rpm is programmed in actual rpm in one rpm increments.
  - Simple two step gear change protects it from any thermal deflection and guarantees stable milling and boring operation even in the low speed range.

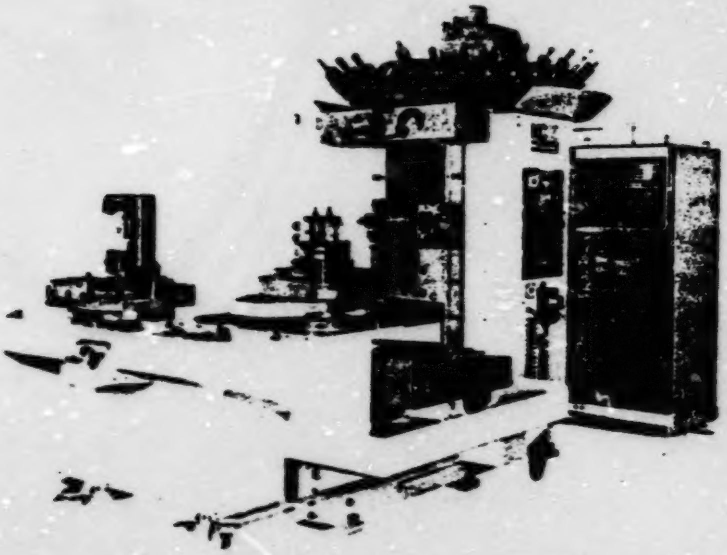
- With simple and fast tool changes
  - Microcomputer controlled random pot coding assures tool selection from magazine in the shortest bi-directional tool path.
  - The magazine can store 30 tools of max. size ϕ135 x 400 mm and 12 kg tool capacity.
  - ATC time: tool-to-tool 3 sec.
    metal-to-metal 10 sec.

- With a large index table capacity
  - A 500 mm square, pallet type work table provides index positions. It rotates bi-directionally in 8 sec. for 90° indexing and 11 sec. for 180° indexing.
  - Edge locators facilitate easy and accurate location of fixtures on T-slotted work table.
  - Handles workpieces and fixtures having a combined weight of up to 700 kg and a size of 620 mm square or 810 mm diameter.
  - Large diameter 420 mm curvic coupling indexer guarantees ±3 sec. indexing accuracy and 4600 kg of clamping force assures stable machining.

- With a self-contained pallet changer as standard
  - Uniquely designed, the integral pallet changer assures faster pallet change and eliminates any extra drive source.
  - Any chip or dust is splashed during pallet changing, thereby the positioning accuracy can be maintained within ±0.01 mm.
  - Pallet changing time is approx. 35 sec.

Specifications

Size of table	500 x 500 mm (20" x 20")
Range of movement (X x Y x Z)	630 x 525 x 500 mm (25" x 20-3/4" x 20")
Spindle center to table top	50 – 550 mm (3" – 22-3/4")
Spindle nose to table center	150 – 650 mm (6" – 26")
Spindle nose/speed/step	ISO. No. 50/10 – 4000 rpm/ stepless
Min. resolution	0.001 mm (±0.00004")
Cutting feed/Rapid traverse	(0.04 – 95 ipm/480 ipm) 0.04 – 95 ipm/480 ipm)
Spindle drive	7.5 kW, DC (10 HP)
Number of tools	30 (4, 60)
Tool shank	SK shank or MAS shank or V flange
Max. tool dia & length	ϕ135 x 400 mm (ϕ5-5/16" x 16")
Machine weight	7500 kg (16500 lbs)



H-Series
Horizontal Die & Mold Machine

Makino Milling Machine Co., Ltd.

Another new development emanates from Makino research

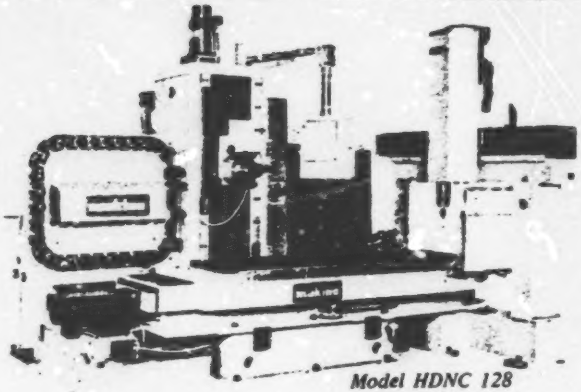
The H-Series Horizontal Die & Mold Machine. This new series realizes high speed, high accuracy machining and fully automates die and mold machining through Makino's long years of cutting experience combined with modern machining center techniques.

- The new horizontal series promotes efficiency of unmanned operations.

  The horizontal machining center construction with automatic tool changer, programmable command controller and complementing automatic equipment realizes completely unmanned die and mold machining.
- Self-contained NC saves floor space.

  The NC unit is mounted on the bed of the main body and the built-in hydraulic unit offer a substantial saving of floor space.
- Excellent accessibility and easy operations.

  The design of the series enables smooth interaction of electro-mechanical systems to minimize human operations. The protruding spindle nose and centralized control panel installed near the spindle simplify centering of the work and allow unrestricted access to the workpiece.



Model HDNC 128

- Semi-floating slideways achieve high-precision machining of heavy work.

  Newly developed pneumatic Semi-Floating Slides are unaffected by the load and cutting force, and permit long-life smooth movements for precision machining.
- ATC and ASC facilities fully automatic copy milling.

  The automatic tool changer (ATC) and automatic stylus changer (ASC) and programmable command controller permit around-the-clock automatic copy milling operations.
- Separated tracing unit realizes high copying accuracy.

  Since the tracing unit is separately installed, high copying accuracy is maintained without influence of vibration during heavy cutting.

Machine Body

Item		Model		H-128	H-178
Table	Length x Width	HNC-(A)	mm (inch)	1500 x 750 (59-1/16 x 29-1/2)	1900 x 750 (74-13/16 x 29-1/2)
		HD-(A), HDNC-(A) (including model table)	mm (inch)	2750 x 750 (108-1/4 x 29-1/2)	3600 x 750 (141-3/4 x 29-1/2)
	T-slot width x number		mm (inch)	22H8 x 5 (13/16H8 x 5)	22H8 x 5 (13/16H8 x 5)
Range of movement	Table longitudinal movement (X axis)		mm (inch)	1250 (49-3/16)	1700 (66-15/16)
	Spindle vertical movement (Y axis)		mm (inch)	800 (31-1/2)	800 (31-1/2)
	Column cross movement (Z axis)		mm (inch)	550 (21-5/8)	550 (21-5/8)
	Spindle center to table top		mm (inch)	50 ~ 850 (2.0 ~ 33-1/2)	20 ~ 820 (3/4 ~ 32-1/4)
	Spindle nose to table center		mm (inch)	50 ~ 600 (2.0 ~ 23-5/8)	50 ~ 600 (2.0 ~ 23-5/8)
	Copying range (X x Y x Z)		mm (inch)	1250 x 800 x 550 (49-3/16 x 31-1/2 x 21-5/8)	1700 x 800 x 550 (66-15/16 x 31-1/2 x 21-5/8)
Feed rate	Cutting feed	HNC-(A)	mm/min(ipm)	0.1 ~ 4000 (0.01 ~ 157.4)	0.1 ~ 4000 (0.01 ~ 157.4)
		HD-(A), HDNC-(A)	mm/min(ipm)	10 ~ 2000 (0.4 ~ 78)	10 ~ 2000 (0.4 ~ 78)
	Rapid traverse	HNC-(A)	mm/min(ipm)	10000 (400)	10000 (400)
		HD-(A), HDNC-(A)	mm/min(ipm)	6000 (236)	6000 (236)
	Copying speed		mm/min(ipm)	10 ~ 2000 (0.4 ~ 78)	10 ~ 2000 (0.4 ~ 78)
Spindle	Spindle nose			ISO No. 50	ISO No. 50
	Spindle speed (steps)		rpm	10 ~ 4000 (1 rpm each stepless)	10 ~ 4000 (1 rpm each stepless)
	Spindle drive motor		kW (HP)	DC 11/7.5 (15/10)	DC 11/7.5 (15/10)
Max. weight on table			kg (lbs)	5000 (11000)	7000 (15400)
Tracer head adjustment	Table top to tracer head		mm (inch)	200 ~ 850 (8 ~ 33-1/2)	200 ~ 850 (8 ~ 33-1/2)
	Spindle center to tracer head center		mm (inch)	1550 (61)	2050 (80-11/16)
	Tracer head longitudinal movement		mm (inch)	100 (4.0)	100 (4.0)
Machine weight	HNC-(A) (including control unit, ATC adds 700 kg (1540 lbs))		kg (lbs)	7500 (16500)	11500 (25300)
	HD-(A), HDNC-(A) (including control unit, ATC adds 700 kg (1540 lbs))		kg (lbs)	9500 (20900)	13000 (28600)

MCH-800

Horizontal Machining Center

Osaka Kiko Co., Ltd.

Features

- Rugged construction
- Full simultaneous capability on three axes
- Independent DC spindle drive with speeds variable from 30 to 3,000 rpm.
- Large, precise tool holders (NS #50 taper)
- Equipped with latest CNC control
- Automatic tool changer with 30-tool capacity (50-tool capacity optional)

Tool Magazine

30 tools are combined in one with the automatic indexing magazine accommodating 30 tools. Starting and stopping are performed at a reduced speed to prevent vibrations and shocks that could have a bad effect on machining accuracy.

Combination Table

The combination table can be used as either a circular indexing table or a plane table. Workpieces of almost any configuration can be machined on this table.

Automatic Tool Changer

With grips at both ends, the swing arm holds and changes tools quickly. The tool holder remains securely locked while the tool changer arm moves, ensuring proper operation.

Coolant Reservoir

The large capacity coolant reservoir is in a separate location to eliminate adverse thermal effects. A special design has been employed to allow for an ample amount of coolant to reach the tools regardless of type or length.

Symmetrical Double Column

The box-type bed and the frame with thermally symmetrical double columns can withstand heavy loads and provide outstanding machining accuracy under the most rigorous operating conditions.

Microcomputer CPU Sequencer

Microcomputer and semiconductor technology has been incorporated to provide highly reliable control of the entire machine. The maintenance board enables the rapid identification of mechanical problems, speeding up maintenance operations.

DC 20/15HP (15/11KW) Spindle Drive (MCH-800)

The speed of the DC spindle motor is variable over a wide range. Operation under optimum conditions is ensured by tooling in the large-bore spindle (4 inches, 100mm diameter) which enables everything from heavy-duty cutting at low speeds to high-speed machining. To maintain a high degree of accuracy during use, an oil jacket is provided for heat dissipation in the spindle area.

Fine Indexing Table (Optional)

The fine indexing table driven by a DC servo motor turns in either a clockwise or a counterclockwise direction and can be indexed in a total of 360 positions.

Specifications

Cutting Area (X x Y x Z): 1200 x 1020 x 815mm (Single table); 2000 x 1020 x 815mm (Combination table).

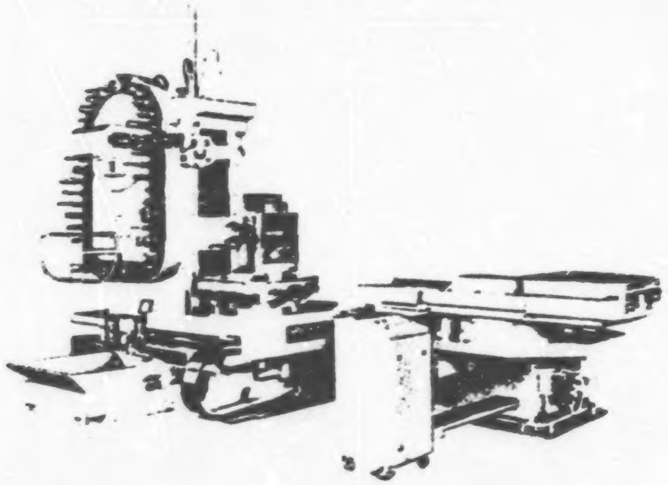
Table dimensions: Index Table – 800mm sq. Combination table – 800 sq. x 2200mm (Combination table).

Index table dividing degrees: Each 5 degrees (optional 1 degree).

Carrying capacity: Only index table – 1500 kgs. Total – 2000 kgs (Combination table).

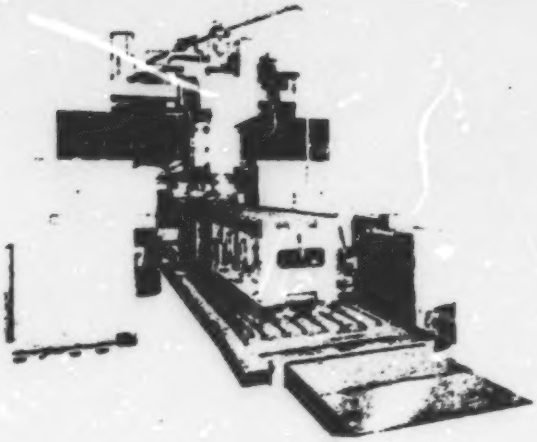
Indexing time: 6 sec./45 degrees, 8 sec./90 degrees, 11 sec./180 degrees.

Travels: Longitudinal travel (X) – 1200mm (Single table); 2000mm (Combination table). Head vertical travel (Y) – 1020mm. Saddle cross travel (Z) – 815mm. Spindle center to table – 100 to 1120mm. Table center to spindle – 250 to 1065mm.



Multi-Center
HF-3

Shin Nippon Koki Co., Ltd.



A five face multi-function center with outstanding all-round machining capacity.
Equipped with a variety of energy-saving devices.

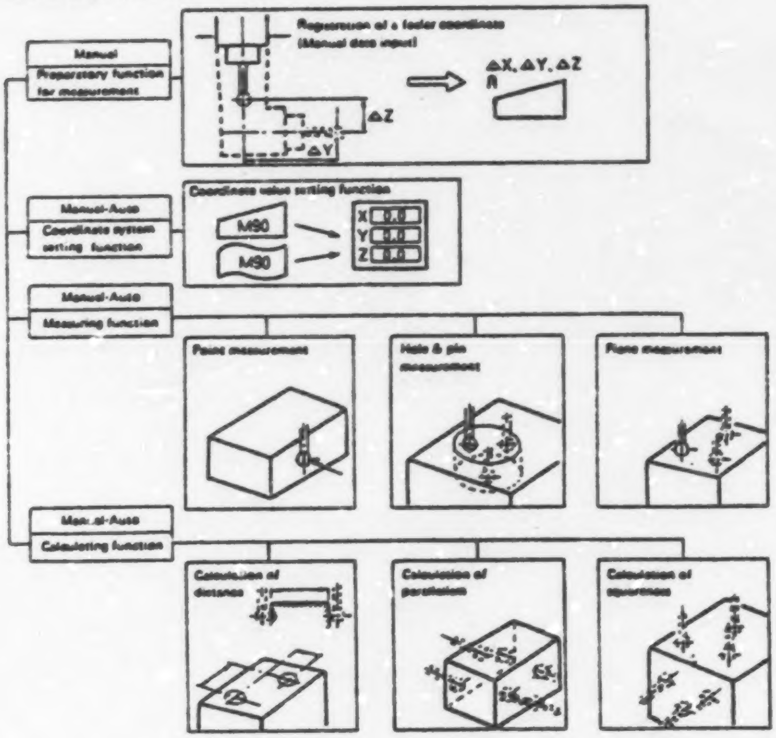
Main Features

- An Automatic Attachment Changer for automatic five-face machining.
- Measurement function for increased quality control.
- A large Automatic Work Changer for increased productivity.
- SNK's "THERCOM" thermal displacement compensator, for high machining accuracy.
- A variety of safety features essential for unmanned operation including tool wear and breakage detector.

Specifications for HF-3

Distance between columns	2,100 mm
Table working surface	1,500 mm x 3,000 mm
Pallet size	1,400 mm x 2,800 mm
Distance from pallet surface to spindle end	1,600 mm
Loading capacity on table [pallet]	10,000 kg [7,000 kg]
Table travel (X)	6,200 mm
Spindle head travel (Y)	2,700 mm
Vertical travel of ram (Z)	750 mm
Crossrail elevating travel (W)	1,050 mm
Rapid feed (X, Y)	9,600 mm/min
Rapid feed (Z)	3,000 mm/min
Rapid feed (W)	4,000 mm/min
Cutting feed	5 – 3,000 mm/min
Spindle speed	30 – 2,000 rpm
Spindle diameter	120 mm
Spindle nose taper	AST No. 50
Spindle drive motor	DC 22 kw

Measuring System


Manual
Preparatory function for measurement
Registration of a feeler coordinate (Manual data input)
ΔZ
ΔY
ΔX, ΔY, ΔZ
R
Manual-Auto
Coordinate system setting function
Coordinate value setting function
M90
M90
X 0.0
Y 0.0
Z 0.0
Manual-Auto
Measuring function
Point measurement
Hole & pin measurement
Plane measurement
Manual-Auto
Calculating function
Calculation of distance
Calculation of parallelism
Calculation of squareness

Millmaster B-3V
Vertical Machining Center with Automatic Tool Changer

Shizuoka Machine Tool Co., Ltd.

Shizuoka Machining Center B-3V was developed for the customers who demand close tolerances with both high speed cutting and low speed heavy-duty cutting. The practical machining center enables amazing productivity plus precision machining.

- High Efficiency Machining

  The husky spindle head for DC 5HP (3.7kw) motor assembled with precision components employs efficient heat exchanger to reduce heat generation for stabilized precision machining. The spindle can be driven direct by S-4 digit function, and speed can be changed variably. The most appropriate cutting condition can be selected for various work materials in a range of 10 – 3600 rpm (10 – 4500 rpm). Available with an automatic tool changer holding 20 tools for milling, boring, drilling and tapping.
- High Precision and Years of Dependability

  The rugged box type substructure of bed and column, frame hardened and ground slide ways, automatic lubrication, and precision ground ball screws with pre-loaded double nuts for all axes to minimize backlash and eliminate stick-slip motion. They combine for precision machining and positioning, and furthermore trouble free life.
- Large Machining Area

  The wide table movement up to 700 mm x 380 mm and the large depth from spindle center to column surface for 420 mm are the next larger size machine's.
- Economical Machining Center

  The compact and simple pneumatic tool change mechanism insures reliable tool change and ease of maintenance, and greatly reduces machine's down time.

Specifications

TABLE – Working surface: 1100 mm x 330 mm. T-slot: 16 mm x 3 x 60 mm. Loading capacity: 300 kg. Travel: Longit. (X), 700 mm; Cross (Y), 400 mm; Vertical (Z), 400 mm.

SPINDLE – Nose taper: ISO No. 40. Speed range: 10 – 3600 rpm (10 – 4500 rpm). Spindle drive motor: 5HP DC motor (30 min).

FEED – Feed rate: 0 – 2000 mm/min. Rapid traverse X, Y, 6000 mm/min; Z, 3000 mm/min. Feed motor: Gettys-Fanuc DC servo motor; X, Y, Model 0; Z, Model 5.

ACCURACY – Positioning: 0.025 mm/300 mm. Repeatability: +0.005 mm.

AUTOMATIC TOOL CHANGER – Tool storage capacity: 20 tools (BT-40). Tool change system: Random. Max. tool weight: 5 kg. Max. tool diameter: 100 mm. Nominal diameter: 75 mm. Max. tool length: 300 mm.

WEIGHT (less NC) – 2200 kg.

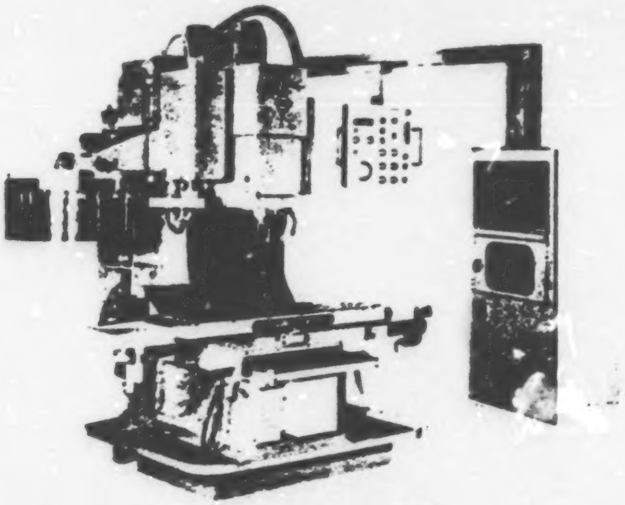
Millmaster B-10V
Vertical Machining Center with Automatic Tool Changer

Shizuoka Machine Tool Co., Ltd.

Machining Center B-10V with Automatic Tool Changer is the answer to the customer for its high productivity and precision machining accuracy with rugged bed type construction.

- Heavy Duty 10 HP DC Motor Drive Spindle

  Incorporated with four angular contact bearings for spindle . . . . well lubricated and properly pre-loaded, and with heat exchanger built on headstock, this minimizes the heat generation for stabilized precision machining. Best work condition can be selected for the various kinds of tools and work materials in the wide range of speed, 10 – 3150 rpm, by means of 10 HP DC main spindle motor.
- Wide Slide Way and Accurate Positioning



Millmaster B-3V

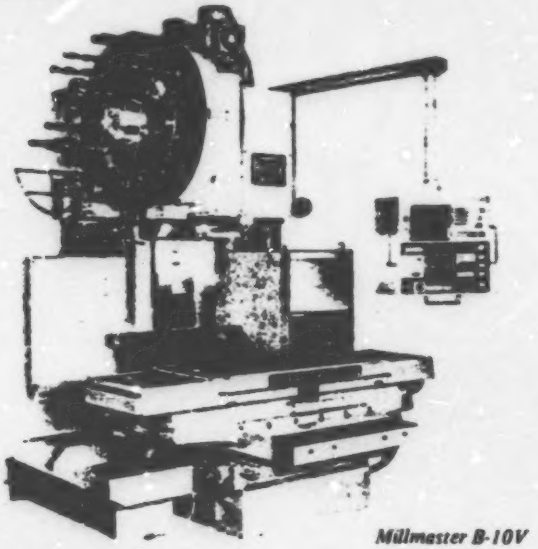
All the slide ways are solid casted, hardened, and ground, and the counter-part of each way is plated with TURCUITE B for smooth movement of head, table and saddle. They maintain the machine rigidity, stability and high precision of machining accuracy.

- Rugged Substructure

  The rugged box type substructure of machine ensures fine machining surface even for heavy cutting at low spindle speed.
- Pendant Control Panel

  All the switches and digital display are centralized on the pendant panel which swings to the most convenient operating position. Operator, therefore, can set up faster and easier.
- Reliable ATC.

  The tool magazine is designed to have 16 tools, max. weight of 10 kg, max. diameter of 140 mm, max. length of 400 mm. The characteristic pneumatic changer arm (double) ensures stable tool change without fault.



Millmaster B-10V

Specifications

TABLE – Working surface: 1200 mm x 500 mm. T-slot: 18 mm x 5 x 100 mm. Loading capacity: 1000 kg. Travel: Longit., 1000 mm; Cross, 500 mm; Vertical, 500 mm.

SPINDLE – Nose taper: ISO No. 45. Speed range: 50/60 Hz 10 – 3150 rpm. Spindle drive motor: 10 HP DC motor (30 min).

FEED – Feed rate: 5 – 3000 mm/min. Rapid traverse (X, Y, Z): 10000 mm/min. Feed motor (X, Y, Z): Gettys-Fanuc DC servo motor Model 10.

ACCURACY – Positioning: 0.025 mm/300 mm. Repeatability: ±0.005 mm.

AUTOMATIC TOOL CHANGER – Tool storage capacity: 24 tools (CT-45). Tool change system: Random. Max. tool weight: 10 kg. Max. tool diameter: 140 mm. Nominal diameter: 115 mm. Max. tool length: 400 mm. Arm type: Double arm.

WEIGHT (less NC): 6100 kg

Model FHN80T

Horizontal Spindle Machining Center

Toyoda Machine Works, Ltd.

– **High Total Productivity Endeavored by Latest Automatic Functions. Efficiency up per One Machine and Reduction of Operator's Burden (Possibility of Being Handled Plural Machines by One Operator).**

- Application of automatic functions

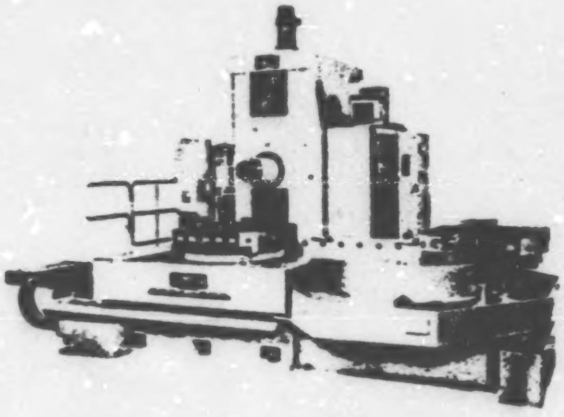
  Higher productivity is assured by adopting such various automatic functions as automatic alignment, gap elimination and tool breakage detection.
- Contribution to easier operation

  Tool Service-life is observed automatically by monitoring function. Handy loading/unloading of tools are attainable due to the tool magazine mounted on machine side. Loading/unloading of component is easier due to the table height as low as 900 mm (35.4").
- Improvement in higher reliability and easier maintenance

  As troubles are exactly found by monitoring function, machine down-time is substantially reduced. Programmable universal sequence controller TOYOPUC can be used for higher reliability and easier maintenance.
- Spindle speed, 20 to 3,600 rpm (4-digit, S-function)

  Wide range of spindle speed (20 thru 3,600 rpm) allows wide variety of machining conditions from low-speed heavy cutting to high-speed cutting.
- Tool magazine capable of storing various tools

  Large diameter tool storage zone enables the capacity of tool magazine maximum.



Specifications

Rotary index table	800 x 800 mm (31.5" x 31.5")
Table index incremental angle	5 degree (automatic)
Table, lateral travel (X)	1,000 mm (39.4")
Spindle head, vertical travel (Y)	900 mm (35.4")
Upright column, cross travel (Z)	800mm (31.5")
Rapid feedrate	10,000 mm/min (394 ipm)
Spindle speed, infinitely variable	20 – 3,600 rpm
Spindle drive motor	DC 11 kW (15 HP)

Automatic Tool Changer

Nos. of stored tools	32
Tool selection	Ramdon selection
Tool size (diameter x length)	Small diameter zone: 110 x 400 mm (4.3" x 15.7") Large diameter zone: 165 x 400 mm (6.5" x 15.7")
Tool weight	Max. 20 kg (44 lbs)

Model FVN50, 50A

Vertical Spindle Machining Center

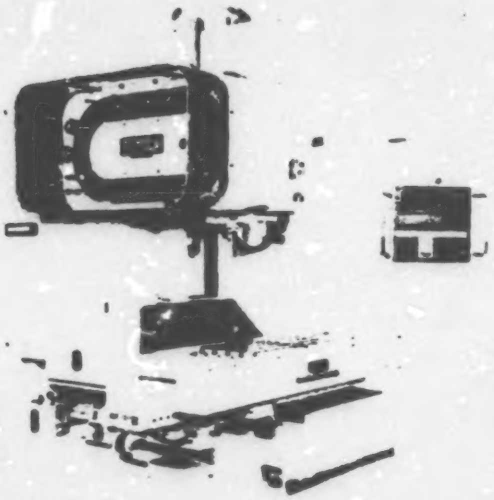
Toyoda Machine Works, Ltd.

- Increased Workability by Total Designing for Saving Costs, Manpower and Space.
- High Total Productivity Endeabored by Latest Automatic Functions.

* Single unit
NC unit, electrical control panel and hydraulic power unit are mounted onto a machine body, and this reduces floor space to 8 m^2 (86 sq. ft. excluding maintenance space), facilitating carriage and installation of machine.

* Easy operation
A pendant type operation panel houses all control switches and buttons, and allows operator to manage whole operation of the machine, watching the component at the front of the machine.

* High spindle capacity
Spindle design bears wide machining range from low speed heavy duty to high speed cutting. Any revolution between 20 and 3,150 rpm are infinitely selectable by means of direct S-coded 4-digit command. A large flywheel gear shows strong and stable action in interrupted cutting or heavy duty cutting.



* Efficient workability
Low table height of 80 mm (31.5") from the floor provides easy accessibility from the front, and brings easy loading/unloading of components and fixture.

* Application of automatic functions
Higher productivity is assured by adopting such various automatic functions as automatic alignment, gap elimination and tool breakage detection.

Specifications

Work table	900 x 630 mm (354.4" x 24.8")...FVN50 1,400 x 630 mm (55.1" x 24.8")...FVN50A
Table lateral travel (X)	800 mm (31.5") 1,250 mm (49.2")...FVN50A
Saddle cross travel (Y)	560 mm (22.0")
Spindle head vertical travel (Z)	560 mm (22.0")
Rapid feedrate	10,000 mm/min (394 ipm)
Spindle speed (infinitely variable)	20 – 3,150 rpm
Spindle drive motor	DC 7.5 kW (DC 10 HP) for 30 min. running and DC 5.5 kW (DC 7.5 HP) for continuous running

Automatic Tool Changer

Nos. of the stored tools	20 pcs.
Tool selection	Random selection
Tool size (diameter x length)	120 x 400 mm (4.7" x 15.7") Larger tool available under certain condition
Tool weight	15 kg (33 lbs)

UB-75

Vertical Machining Center

Urawa Machine Tools Mfg. Co., Ltd.

Construction

The machine is constructed of cast iron castings comprising of a one piece base, 2 vertical columns and a cross beam, which supports the main spindle saddle. The steel guarding system completely surrounds the working area with front access thro' two hinged doors, and provides excellent visibility.

The table is 820 x 680 mm incorporating 6 x 18 mm tee slots running parallel to the X axis at 100 mm intervals. The machine can accommodate a working envelope of 700 x 500 mm x 400 mm high assuming 150 mm max tool length.

Slideways

All slideways are hardened and ground with low friction Turcite coating and automatic lubrication. The X and Y axis slideways are 100 mm wide. A fabric cover and flexible metal cover protect the X and Y axis respectively.

Spindle

The 5 bearing spindle is driven directly by 6 vee belts from motor to spindle pulley's providing smooth speed change and reduced noise and vibration. The Fanuc spindle motor is 5.5 kw continuous with 7.5 kw 30 min. intermittent rating. Standard speed range 40 – 4000 rpm (Option: 30 – 3000 rpm) air blast provides automatic cleaning of spindle and adaptor during T.C.

Axis Drives

Gettys-Fanuc Model 5 D.C. Servo motors controlled transistor velosity control unit provide that drive to all axes. The X and Y axis ballscrews are 40 mm dia x 8 mm pitch and the Z axis ballscrew is 40 mm dia x 5 mm pitch.

A.T.C.

The 18 station A.T.C. is situated at the back of the machine table providing easy access to the magazine from the rear of the machine. Tool changes time is a very slick. The A.T.C. protection cover that is located in front of the A.T.C. opens automatically prior to tool change and closes to protect the magazine from the working area. The magazine is operated by Geneva mechanism hydraulically and an air operated alot-pin locks each position.

In the case of 22 station A.T.C. (optional specification), the magazine is driven by D.C. survo motor (FANUC Model 0) and controlled by FANUC made special numerical control system that consists of 1 IC circuit board located inside of electric enclosure box. (This control system doesn't mean 4th axis controllor). Tool change takes place at the machine home position i.e. X axis 30 i.e. X axis 30 mm offset from Table C.

Y axis max. plus. Table towards front
Z axis max. plus (full retract)

This leaves the table completely clear for loading and inspection, etc. The tool change interlocks at this position provide utmost operator safety and ATC protection.

Control

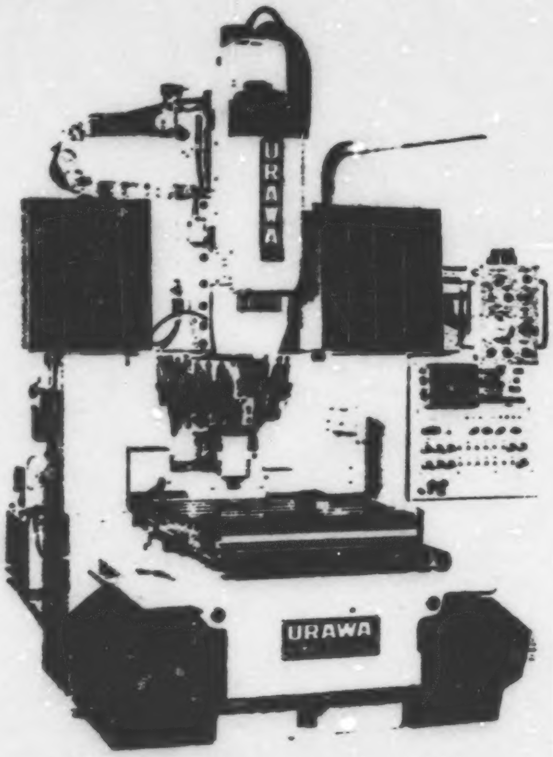
The Fanuc 6M Model B C.N.C. with C.R.T. and the machine control panel are situated at the front right hand side and the tape reader is adjacent along the side of the machine. A pendant is standard housing the operator panel. The A.T.C. can be manually operated thro' the complete cycle which also provides facility for manually loading tools. The controls are well positioned for the operator with joy stick control of X, Y and Z axis, mirror image switches and Z axis feed neglected switch, a good feature for tape proving.

Ancillary Equipment

The hydraulic unit, NC cabinet and servo unit are all neatly positioned within the machine perimeter in area at the rear of the machine. Air is supplied at 4 – 5 kg/cm^2. The two coolant and swarf trays are position at floor level on either side of the machine table. Coolant is pumped down the left hand side of the saddle to the work area. Floor area required is 2.5 mtrs x 2.6 mtrs deep.

Installation

The machine is lifted by wire slings which are passed around two lifting bolts mounted on the bed front and thro' two holes cast in the back of the X axis beam. The machine is levelled at 5 positions 3 primary and 2 secondary point. Bolting down is not necessary.



Specifications

Table	Working surface	820 mm x 680 mm
	Longitudinal travel X axis	700 mm
	Cross travel Y axis	500 mm
	Distance spindle nose to table	150 – 550 mm
	Table load	400 kg
Head	Vertical travel Z axis	400 mm
	Spindle taper	N.T. 40
	Spindle speeds	40 – 4000 rpm (30 – 3000 optional)
Feeds	Cutting feed rate	1 – 3000 mm/min
	Rapid traverse X and Y axis	10,000 mm/min
	Z axis	7,000 mm/min
A.T.C.	No. of tools	18
	Tool selection	Random selection by direction
	Max. tool size	100 x 300 mm
	Max. tool weight	7 kg
	Tool selection	4 seconds
	Chip to chip	Under 10 seconds
Motors	Spindle motor	Continuous DC 5.5 kw
	X, Y, Z axis	DC servo
	Hydraulic motor	1.5 (4P) kw
	Coolant motor	0.18 kw
Required floor space		5.0 m^2 (7750 in^2)
Machine weight		5300 kg

Model AS-355
Angular Slide Grinder

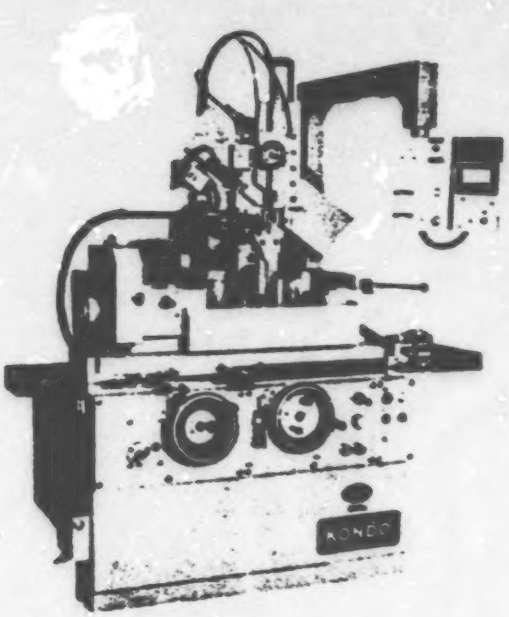
Kondo Machine Works Co., Ltd.

This series has been developed for the purpose of grinding the end surface and the cylindrical portion of the work simultaneously, effectively and accurately, in large lot production through simple operating procedure.

- Spindle Bearing
  Hydro-dynamic bearings supporting the spindle ensure high speed and heavy duty grinding operation through minimizing generated heat and diminishing spindle deviation from the center.
- Highly Accurate Dressing Mechanism
  Template copying dresser, employing hydraulic servo-valve, provides stable and accurate dressing operation, thus high production accuracy being assured.
- Wheel Automatic Feed Mechanism
  Automatic grinding feed is performed hydraulically and mechanically, assuring stable wheel head positioning accuracy.
  Backlash eliminated ball screw, which feeds the wheel head, provides highly accurate infeed.
- Angle of the Wheel Head Slide
  Wheel head is feed in the angle of 36° 52' 12". The established angle made it easy to set the grinding amount at the end surface:
  Traverse amount: OD grinding amount: end surface grinding amount = 5 : 4 : 3. Burning at the end surface during grinding, due to the difference of the grinding speed at the outer portion and at the inner portion, can also be diminished by feeding the wheel head at this angle.

Specifications

Capacity	
Swing over table	250 mm
Distance between centers	355 mm
Grindable outer diameter	100 mm
Permissible weight of work (in case of center work)	50 kgf
Grinding wheel	
Size of grinding wheel (outer dia. x width x inner dia.)	ϕ510 x 25 – 75 x ϕ203.2 mm
Rotation speed (without load)	1,125 r.p.m.
Grinding head	
Travel length (screw stroke)	125 mm
Rapid travel length (oil pressure feed)	75 mm
Slide angle	36°52'12"
Manual cutting (regarding dia.)	ϕ200 mm
Per hand wheel rotation (regarding dia.)	ϕ2 mm
Per micro-color graduation (regarding dia.)	ϕ0.005 mm
Table	
Travel length	Manual 400 mm
Travel length of handle wheel per rotation	20 mm
Fine feed	0.01 mm
Turning angle	8°30' – 4°30'



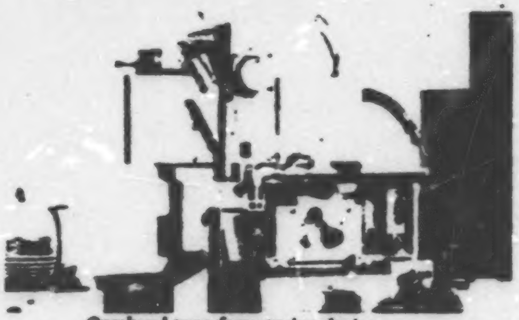
]

Model UGK-750
Universal Grinding Machine

Kondo Machine Works Co., Ltd.

Precision universal grinder with sharp grinding performance and high stability. This machine is very versatile as a universal grinder. The use of various attachments expands the range of performances of this machine more widely. The UKG-750 universal grinder is very suitable not only for single-part production, but also for mass-production, when the automatic sizing device is incorporated.

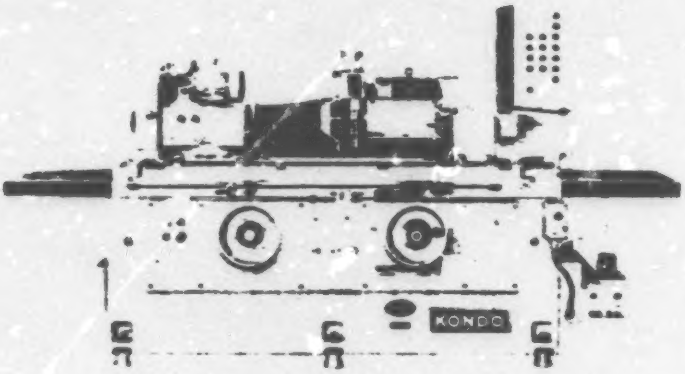
- The Wheel-Spindle Bearing
  The wheel-spindle bearing is a hydrodynamic sliding bearing composed of three supporting areas. It is designed to develop very high oil pressure in oil wedges on the supporting areas. Due to the pressure developed the center of spindle rotation is held rigidly at the center of the bearing opposing against heavy grinding forces applied.
  To suppress the temperature rise of the bearing as possible special measures are adopted so effectively, that the dislocation of the spindle center relative to the workpiece center by thermal influences is kept to the minimum.
- Easy Operation
  To ensure highly efficient production for single-part production, that is, for various kinds of workpieces, and also for mass-production thoughtful considerations have been given to the construction and arrangement to have simple operation and easy adjustment of the machine and also of the attachments.
- Elimination of the Thermal Deformation of the Machine
  To maintain high grinding accuracy by eliminating thermal deformations of the bed caused by the coolant, the heat-insulated passages of the coolant are prepared to avoid the direct contact of the coolant flow with the machine bed.
- Cylindrical Grinder for Mass-Production of Shafts
  As a sister grinding machine of this UGK-750 universal grinding machine the CGK-750 cylindrical grinding machine, which is suitable particularly for mass production, is included in our manufacturing program. The CGK-750 cylindrical grinding machine has neither a swivelling wheelhead nor a swivelling workhead and is arranged only for grinding between dead centers.



Overhead type form truing device

Specifications

Capacity	
Swing over table	300 mm
Distance between centers	750 mm
Max. diameter to be ground	200 mm
Allowable max. weight of workpiece	80 kgf
Wheel-spindle	
Grinding wheel (D x W x d)	ϕ405 x 38 (25 – 75) x ϕ203.2 mm
No. of speed	1
Speed	1,500 rpm
Max. peripheral speed of wheel (standard)	2,000 m/min
Max. peripheral speed of wheel (for special model 45M)	2,700 m/min (2,120 rpm)
Table	
Total stroke	880 mm
Stroke per one rev. of handwheel	20 mm
Swivel angle	8°30' – 4°30'
No. of speeds	Infinite
Traverse rate	10 – 2,000 mm/min

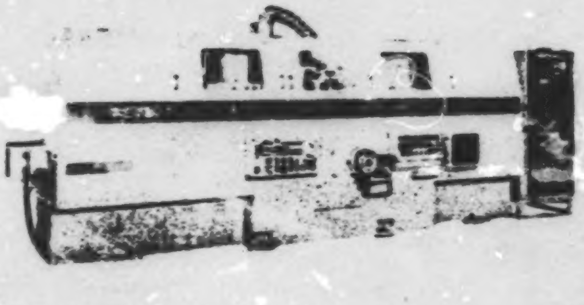


Model GSWN
Thread Grinding Machines

Mitsui Seiki Kogyo Co., Ltd.

Advantages gained by using CNC Control on Thread Grinding Machines

- The use of CNC Control greatly facilitates adjustment and set-up of the machine.
- CNC-Control provides an unlimited variety of pitch dimensions and a very accurate multiple-start thread grinding facility.
- Backlash compensation is adjusted only once during the assembly of the machine and does not have to be done again. Actual backlash of the table drive can thus be held within less than .000040" as compared with more than .000400" on standard thread grinders.
- With CNC Control a wide range of work spindle speeds is available to the operator (.1 to 100 rpm), the lowest speed range being extremely useful for machine set-up and checking the thread.
- There are certain applications which require very accurate table positioning control at the end of the threaded portion of the work piece, so as to avoid interference of the grinding wheel with adjacent shoulders. In these cases NC control provides table positioning accuracy within .000010" which is far more accurate than what can be obtained from table positioning cams on ordinary machines.
- Also, thread profile cylindrical grinding may be performed on a thread grinder equipped with CNC Control taking advantage of the very high positioning accuracy of the machine table resulting in a pitch accuracy of better than .000040" on the work piece.
- When grinding long lead screws CNC Control offers the additional advantage of rapid table return with the work stopped thus avoiding heat generation on the steady rests.
- Lead corrections can easily and accurately be made by entering data into the CNC Control. This is far more accurate than using mechanical correction devices.
- Another useful feature of CNC Control is the programmable correction of lead screw pitch errors in steps of .000008" which permits to cut in half the already extremely high accuracy of MITSUI SEIKI lead screw assemblies.
- By omitting a large number of mechanical links between drive motor and lead screw, many sources of pitch errors are eliminated.
  Also, separate drive motors for work spindle and lead screw provide more positive control. This means in effect that CNC Control provides better accuracy of table position relative to the angular position of the work spindle which is tantamount to better machining accuracy.
- Occasionally lead screws are required to be manufactured with certain intentional deviations from perfect pitch. While this is very difficult to accomplish on a standard thread grinder which is painstakingly designed and built for linear pitch accuracy, CNC Control provides means of programming any desired amount of erratic pitch pattern.
- For certain applications dual pitch grinding is required, for instance, when grinding worms with variable width of teeth. This is very difficult to do on a standard thread grinder, but becomes an easy job taking advantage of the facilities offered by CNC Control.
- A third axis can be added to the CNC Control of the machine for applications in which simultaneous control of the grinding wheel infeed is required, for instance in the manufacture of special screws for plastic injection machinery. This feature is available as optional equipment.
- CNC Control is also available for the dresser of the machine when highly complex thread profiles are to be ground as is the case with air compressor screws.
- CNC Control is available for both external and internal thread grinding machines manufactured by MITSUI SEIKI.



Model GSWN 1000

Specifications

Model	GSWN-1000	GSWN-2000	GSWN-3200
Maximum diameter work ground	200mm	←	←
Maximum diameter swing over table	480 mm	←	←
Maximum work length between centers	1200 mm	2200 mm	3650 mm
Maximum thread portion to be ground	1130 mm	2130 mm	3300 mm
Wheel size	ϕ510 x 10 – 50 x 228.6 mm	←	←
Maximum wheel speed of wheel	2100 & 2700 m/min	←	←
Maximum helix angle setting on wheel, right or left	±45°	←	←
Net weight	10,000 kg	12000 kg	18000 kg

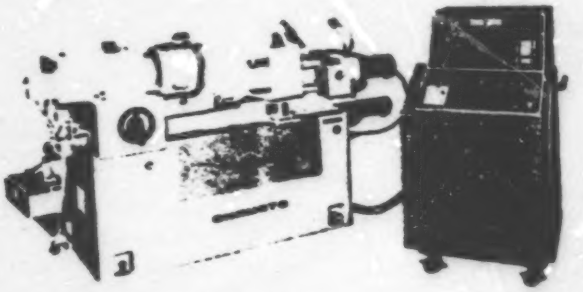
Model IGM-1 ENC
NC Internal Grinding Machine

Okamoto Machine Tool Works, Ltd.

The OKAMOTO NC Internal Grinding Machine Model IGM-1ENC has been designed for high precision and productive internal grinding works with a wheelhead cross feed and a table longitudinal movement numerically controlled and is best suited for various workpieces not only in mass production works but also in small job shop works shown below.

Features

- All electro-mechanical drive permits fast setup, precise movements and low thermal displacement of the machine.
- High grinding concentricity and tremendous grinding time reduction can be obtained as multi-stepped holes, outside and end surfaces are ground in one chucking of workpiece.
- Hard-to-grind materials that require frequent wheel dressing operations can be quickly ground as such complex operations are automatically performed by NC system.
- Uniform grinding accuracy can be obtained as delicate grinding conditions such as wheel longitudinal and cross feeds, dressing amount and dressing speed, etc. are accurately reproduced even in a long period of machine operation.
- The distance (L) between two end surfaces shown in Example (A) can be accurately and quickly ground with this machine which will not be practical in mass production when used conventional internal grinding machine.
- Key board type manual data input and a CRT display provide easy programming corrections which will frequently happen in grinding operations to establish optimum grinding and dressing conditions.



Specifications

Capacity	
Internal diameter to be ground	6 – 100 mm (0.24 – 3.94")
Maximum grinding stroke	200 mm (7.9")
Maximum swing inside splash guard	270 mm (10.6")
Maximum longitudinal table travel	500 mm (19.7")
Maximum cross wheelhead travel	100 mm (3.94")
Speeds and Feeds	
Table longitudinal movement (Z axis)	
Least input increment	0.001 mm (0.0001")
Automatic feed	0.1 – 5000 mm/min
Rapid feed	5000 mm/min (197 ipm)
Wheelhead cross movement (X axis)	
Least input increment	0.001 mm (0.0001") in diameter
Least command increment	0.0005 mm (0.00005")
Automatic feed	0.1 – 800 mm/min
Rapid feed	800 mm (31.5")
Wheel spindle speed range	10000 – 60000 rpm
Work spindle speed	100 – 800 rpm

Model NFG-52
Precision NC Profile Grinding Machine

Okamoto Machine Tool Works, Ltd.

Patented Unique Grinding System Offers Precision Profile Grindings with Great Flexibility

The OKAMOTO Precision NC Profile Grinding Machine Model NFG-52 has been specifically designed for high precision profile grindings with a saddle and a wheel head numerically controlled and is best suited for the finishing of various kinds of workpiece such as punches, dies, templates, cams, formed cutting tools, gauges, gears and other precision parts. OKAMOTO's patented unique grinding system affords wide range of grinding applications and high grinding accuracy with our ample experiences on NC profile grinding machines in past over ten years as a pioneer in the world.

Unique Grinding Systems (Patent)

A wheel dressing device with a single arm is supplied as an option and mounted on the right end of table. A diamond tool with a roof shape is attached on the top of arm. This arm is tilted in three positions in order to avoid interferences between diamond tool and the wheel whose motions are automatically controlled by NC command. Our unique design concept on NC profile grinding is based on following three kinds of methods.

- Plunge Grinding Method

  Grinding wheel periphery is numerically trued in connection with a profile of workpiece and grinds the workpiece by plunge grinding method. This method is suitable for production grinding of narrow parts. For the grinding of wider parts, two or more operations are combined by changing of the grinding wheels.

- Contouring Grinding Method

  Grinding wheel periphery is numerically trued to a simple round form. The saddle which is mounting the workpiece and the wheel are numerically moved corresponding to the profile of workpiece. This method is suitable for wider profile grinding and for the grinding of tungsten carbide necessitating a use of diamond wheel.

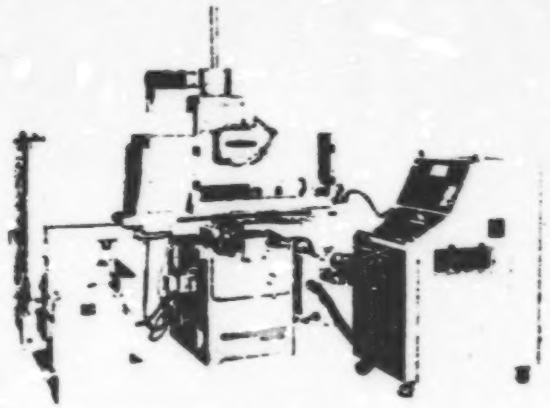
- Compound Grinding Method

This combines aforementioned two methods and suitable for the grinding of workpieces with identical profiles in succession, such as racks, gears, etc. Gears are ground with an automatic indexing head supplied as an option. Optimum tooth profile modification on gears and racks are easily obtained with simple programming changes.

Specifications

Capacity

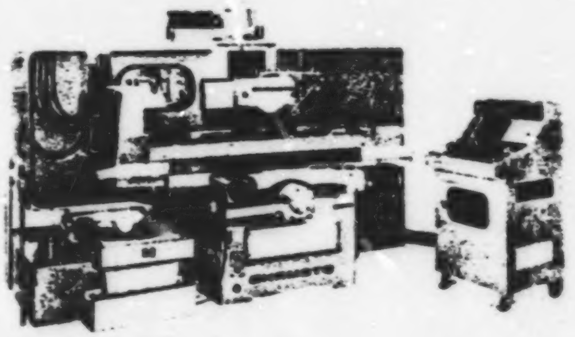
Table working surface (Length x width)	550 x 200 mm
Maximum table travel (Manual: Longitudinal x cross)	605 x 230 mm
Maximum distance under 205 mm dia. wheel to table top	397 mm
Maximum permissible weight of workpiece on the table	200 kg
Table	
T slot: Width x number	17 mm x 1
Longitudinal feed	
Hydraulic	0.3 – 25 m/min
Hand feed per revolution	47 mm
Manual cross feed	
Hand feed per revolution	0. 1mm
Hand feed per one graduation	0.001 mm
Continuous feed	0 – 500 mm/min
Minimum increment	0.001 mm
Automatic cross feed	
Step feed per stroke	0.001 – 0.5 mm
Continuous feed (F4 digits)	1 – 600 mm/min
Rapid cross feed	600 mm/min



Model NFG-63
Precision NC Profile Grinding Machine

Okamoto Machine Tool Works, Ltd.

The OKAMOTO Precision NC Profile Grinding Machine Model NFG-63 has been specifically designed for high precision profile grindings with a saddle and a wheel head numerically controlled and is best suitable for the finishing of various kinds of workpiece such as punches, dies, templates, cams, formed cutting tools, gauges, gears and other precision parts. OKAMOTO's patented unique grinding system affords wide range of grinding applications and higher grinding accuracy with our ample experiences on NC profile grinding machines in past over ten years as a pioneer in the world.



Features

- Movements of Wheel and a Workpiece Are Controlled with a Minimum Increment of 0.001 mm.
  - Intricate and fine forms can be ground which are completely impossible with other model.
  - Wheel dressing operations prior to a final finishing with a minimum stock removal remained ensures high accuracy as per programmed configuration of workpiece due to a neglection a wear of grinding wheel in final grinding operation.
- All Operations Are Actuated by a Tape
  - Multi machines can be operated by one operator.
  - No man operation of the machine for long time provides higher working rate of the machine.
- All Grinding Conditions Are Punched in the Tape
  - Skill is not an important factor in the operation of the machine.
  - Less deviation can be expected on the quality of the workpiece.
  - Forms and grinding conditions are easily changed and modified by programming.
  - Reproduction of the workpiece is easy even after a long time interruption of the operation.

Specifications

Capacity

Table working surface (Length x width)	600 x 300 mm
Maximum travel of table (Longitudinal x cross)	800 x 330 mm
Maximum distance under 305 mm dia. wheel to table	347.5 mm
Dimension of standard magnetic chuck	600 x 300 x 108 mm
Table	
T slot (Width x number)	17 mm x 3
Longitudinal feed (hydraulic)	0.5 – 25 m/min
Hand feed per revolution	69 mm

Model GB32A-32x100
CNC/CBN Production Cylindrical Grinder

Toyoda Machine Works, Ltd.

– A Newly Developed CNC/CBN Production Angular Wheelside Cylindrical Grinder. Designed for the Economical Production of Quality Components Having Multiple Diameters, Shoulders, Tapers and Fillet Radii in One Loading with a Long-Lasting Super Abrasive-CBN Wheel.

- Improved Productivity

  Highly efficient grinding through maximum utilization of CBN wheel's outstanding characteristics and CNC's inherent versatile capabilities.

  Production of quality components through programmed automatic grinding cycles and superb cutting performance of a long-lasting CBN grinding wheel.

  Compact and rugged machine design aimed at taking full advantage of CBN wheel's intrinsic capabilities.

  Drastic reduction in wheel changeover time and setup time.

  Substantial reduction in non-productive time through rapid wheelfeed rate of 7m/min (267 ipm) and table rapid feedrate of 13m/min (512 ipm).
- Higher Reliability

  Highly consistent accuracy and long-life performance assured by TOYODA STAT BEARING for the wheel spindle.

  TOYODA-developed CNC system integrated with a simple machine construction for added reliability.

  More expanded self-diagnosis functions for minimized downtime and higher machine utilization.

  TOYODA-engineered universal programmable sequence controller TOYOPUC supplied as standard equipment for even higher reliability and better serviceability.
- Full Measure of Safety and Better Work Environment

  Newly developed E.M.I. (Electrical Mechanical Interlock) for safety control of rapid feed.

  Strong wheel guard built to OSHA's safety requirements.

  A really quiet machine engineered with a full measure of noise abatement.
- Unmatched Easy Operation

  Centralized front operation panel for easier operation and monitoring.

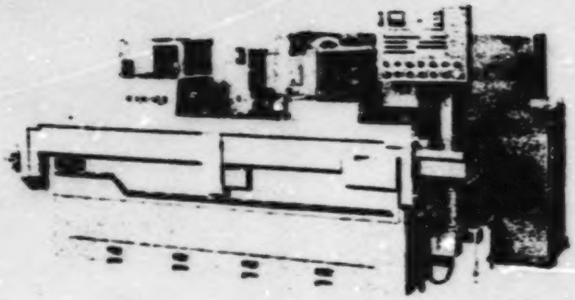
  A standard handy operation panel (MDI) for on-machine entry of grinding data without tape preparation.

  Fast entry of grinding data through an optional cassette tape loader.
- More Energy Saving

  Use of power saving valves with minimal hydraulic power unit serves saving more of energy.

  Neatly packaged machine and control with CNC form a compact unit, saving floor space.

Specifications



Swing over table	320mm (12.6")
Distance between centers	1,0[illegible]mm (39.4")
Diameter to be ground	0–150mm (0–5.91")
Max. load held between centers	250kg (550lbs.)
Automatic rapid feed stroke	80mm (3.15")
Rapid wheelfeed rate	7,000mm/min. (276ipm)
Min. increment per pulse	0.001mm on dia. (0.00004" on dia.)
Grinding wheel OD x Width x ID	355x38x152.4mm (14x1.5x6")
Grinding wheel speed	2,690 rpm
Grinding wheel surface speed	50m/sec. (9,800sfm)
Table rapid feedrate	13,000mm/min. (512ipm)
Min. increment per pulse	0.001mm (0.00004")
Workhead center taper	MT No. 4
Spindle speed	30–360rpm, infinitely variable
Footstock center taper	MT No. 4
Max. retracting stroke of center	60mm (2.36")
Taper correction amount	±0.1 mm (±0.004")
Electric motor	
for wheel drive	11kw (15HP) 4P
for work drive	1.0kw (1.3HP) 6P
for wheelfeed	1.1kw (1.5HP) DC
for hydraulic oil pump drive	0.75kw (1.0HP) 4P
for lubricant pump drive, wheel	0.75kw (1.0HP) 4P
Spindle bearings	
for coolant pump drive	0.25kw (0.3HP) 2P
for table feed	1.1kw (1.5HP) DC
Tank capacity	
for hydraulic drive oil	50 ℓ (13.2gal.)
for lubricant, wheel spindle bearing	40 ℓ (10.6gal.)
for coolant	300 ℓ (79.3gal.)
Floor space required	5,900x2,400mm (233x95")
Net weight	6,300kg (13,900lbs.)

Model G42A-32x63
CNC Production Cylindrical Grinder

Toyoda Machine Works, Ltd.

– A Newly Developed CNC Production Angular Wheelslide Cylindrical Grinder Raises Total Productivity.

- Improved Productivity

  Highly efficient grinding through maximum utilization of CNC's inherent versatile capabilities.

Production of quality components through automatically controlled grinding cycles.

Substantial reduction in non-productive time through rapid wheelfeed rate of 7 m/min (276 ipm) and table rapid feedrate of 13 m/min (512 ipm).

Drastic reduction in wheel changeover time and setup time.

- **Higher Reliability**

  Highly consistent accuracy and long-life performance assured by TOYODA STAT BEARING for the wheel spindle.

  TOYODA-developed CNC system integrated with a simple machine construction for added reliability. More expanded self-diagnosis functions for minimized down-time and higher machine utilization.

  TOYODA engineered universal programmable sequence controller - TOYOPUC - supplied as standard equipment for even higher reliability and better serviceability.
- **Full Measure of Safety and Better Work Environment**

  Newly developed E.M.I. (Electrical Mechanical Interlock) for safety control of rapid feed.

  Strong wheel guard built to OSHA's safety requirements.

  A really quiet machine engineered with a full measure of noise abatement.
- **Unmatched Easy Operation**

  Centralized front operation panel for easier operation and monitoring.

  A standard handy operation panel (MDI) for on-machine entry of grinding data without tape preparation.

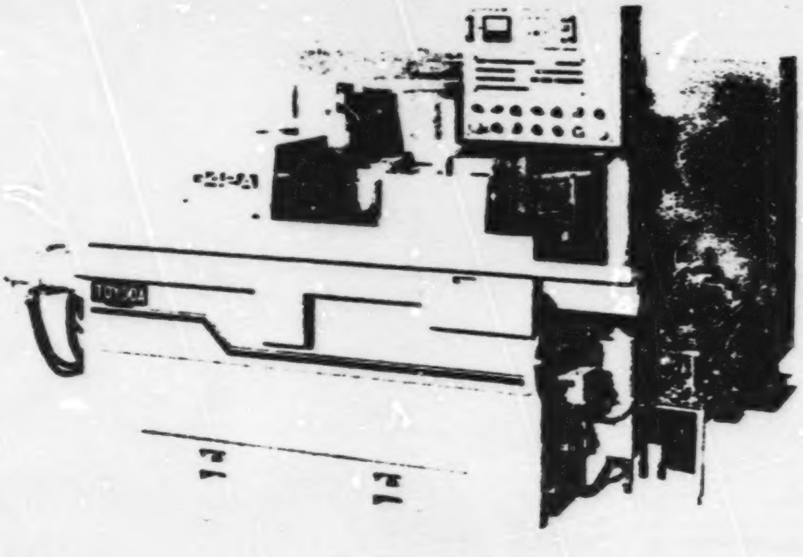
  Fast entry of grinding data through an optional cassette tape loader.
- **More Energy Saving**

  Use of power saving valves with minimal hydraulic power unit serves saving more of energy.

  Neatly packaged machine and control with CNC form a compact unit, saving floor space.

Specifications

Swing over table	320mm (12.6")
Distance between centers	630mm (24.8")
Diameter to be ground	0–150mm (0–5.91")
Max. load held between centers	100kg (220lbs.)
Automatic rapid feed stroke	80mm (3.15")
Rapid wheelfeed rate	7,000mm (276ipm)
Min. increment per pulse	0.001 mm on dia. (0.00004" on dia.)
Grinding wheel OD x Width x ID	455 x max. 100 x 152.4mm (18 x max. 3.94 x 6")
Grinding wheel speed	1,885 rpm
Grinding wheel surface speed	45m/sec. (8,850sfm)
Table rapid feedrate	13,000mm/min. (512imp)
Min. increment per pulse	0.001mm (0.00004")
Workhead center taper	MT No. 3
Spindle speed	30–360rpm, infinitely variable
Footstock center taper	MT No. 3
Max. retracting stroke of center	40mm (1.57")
Taper correction amount	±0.1mm (±0.004")
Electric motors	
for wheel drive	7.5kw (10HP) 4P
for work drive	0.75kw (1.0HP) 6P
for wheelfeed	0.8kw (1.1HP) DC
for hydraulic oil pump drive	0.75 kw (1.0HP) 4P
for lubricant pump drive, wheel	0.4kw (0.5HP) 4P
Spindle bearings	
for coolant pump drive	0.25kw (0.3HP) 2P
for table feed	1.1kw (1.5HP) DC
Tank capacity	
for hydraulic drive oil	50ℓ (13.2gal.)
for lubricant, wheel spindle bearings	40ℓ (10.6gal.)
for coolant	200ℓ (52.8gal.)
Floor space required	2,830x2,415mm (112x95")
Net weight	4,700kg (10,400lbs.)



Milling Machine

Model AM1547

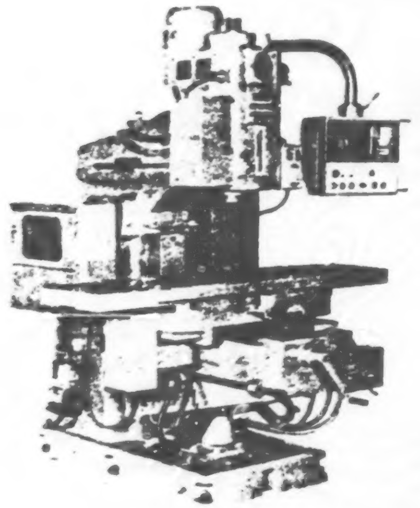
CNC Vertical Milling Machine

Enshu Limited

The ACCU-MILL is a highly accurate performer specially designed with both accuracy and dependability in mind. Many features are carefully built into the machine to assure maximum ease of setup and operation.

Specifications (mechanical portion)

Spindle drive motor	3 kw (continuous) (AC 220/440V)
Spindle speed range	infinitely variable from 75 to 3,500 rpm
Table size (working surface)	381 x 1,194 mm
Table T-slots	four 18 wide T-slots every 80 spacings
Table longitudinal travel (X axis)	762 mm
Saddle cross travel (Y axis)	393 mm
Quill vertical travel (Z axis)	152 mm
Knee vertical travel	444 mm
Quill diameter	110 mm
Spindle nose to table top distance	13 (min.) – 457 (max.) mm
Spindle center to column ways	406 mm
Spindle taper	NST-40
Rapid traverse rate (X & Y axes)	7,620 mm/min
(Z axis)	3,810 mm/min
Feed range (X & Y axes)	0 – 3,810 mm/min
(Z axis)	0 – 3,810 mm/min
Positioning accuracy	±0.02/300 mm
Positioning repeatability	±0.005 mm
Maximum weight of workpiece	450 kg
Machine weight	2,500 kg
Floor space	2,556 x 1,850 mm
Machine total height	2,225 mm



Features

- Direct-reading RPM indicator dial for easy speed selection (programmed speed changer is optional).
- Manual pulse generator, 3 axes selective, by x1, x10, x 100.
- 152 mm quill travel for extended machining depth. 110 mm diameter quill with automatic (programmed) quill clamp system. Quill feed range: 0-3,810 mm/min.
- Tape reader for easier operation and effective machining. Tape punch interface of ASR33.
- Rectangular column ways assure rigid knee support.
- Extra heavy-duty knee, saddle, table & column combination is designed for CNC milling operation.
- Hardened and precision ground saddle ways on the massive knee.

Heavy Duty Construction

Massive 970 mm wide saddle, and 510 mm wide knee way support large table and 450 kg workpiece. 110 mm diameter quill holds heavy cutting.

Machining Capacity

Milling capacity (by ϕ100 mm face mill): 164 Cu. cm. in Aluminum, 100 Cu. cm. in Cast Iron, 65 Cu. cm. in Mild Steel. (by HSS ϕ20 mm end mill): 37 Cu. cm. in Cast Iron, 25 Cu. cm. in Mild Steel. Drilling Capacity: ϕ 35 mm in Mild Steel.

Accuracy

Positioning accuracy: ±0.02/300 mm

Repeatability: ±0.005 mm

Standard Accessories for ENSHU/FANUC System 3M

Controlled axes: 3 axes (X, Y, and Z). Simultaneously controlled axes: 2 axes. System resolution: 0.001 mm. Keyboard manual data input (MDI). CRT character display. Decimal point programming. Selective absolute/incremental programming within the same block of data. Programming of absolute coordinate zero. Positioning, linear and circular interpolations across different quadrants. Buffer storage. Dwell. Cutter compensation B: ±6 digits, G39, G40, G41, G42. Tool Length Offset: ±6 digits, G43, G44, G49. (up to 32 sets in total of cutter compensation B and tool length offset values). Manual pulse generator. Dry run. Self diagnostics. Backlash compensation. Single block. Optional block skip. Machine lock. 4 Digit sequence number display. Sequence number search. Program number search. Manual/automatic return to reference point. Canned cycle (G80 thru G89). Constant tangential feedrate control. Mirror image: with respect to X and Y axes. Inch/Metric conversion. Tape reader. Part program storage and editing: 10 m of tape information. Stored pitch error compensation.

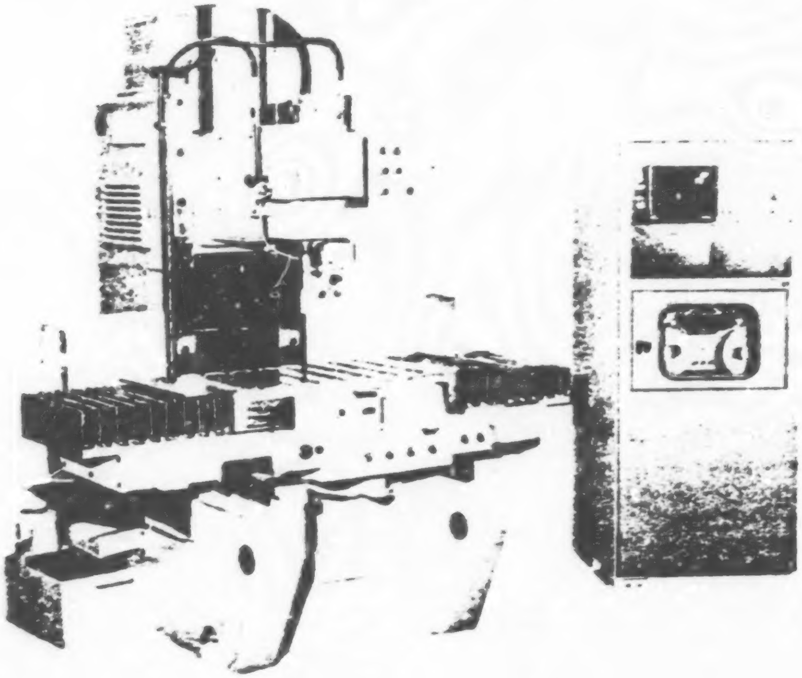
Model EDN-64 with Fanuc 6MB
Super Precision Die Sinking and Engraving Machine

Iida Machinery Co., Ltd.

Super precision die sinking and engraving machine Model EDN-64 has been developed to meet various requirements of super precision and high productivity of die sinking, engraving and milling operations. Outstanding features of Model EDN-64 are as follows.

- ★ Rugged construction of the bed, column, saddle and spindle head.
- ★ 3-point levelling screw support of the bed.
- ★ Wide selection of the spindle unit for various operating conditions
  - – cutting diameter, workpiece material and surface finish, etc. The air turbine driven spindle is available to meet special requirements. All spindles are easily replaced on the spindle head.
- ★ Extremely accurate and smooth feed motion on each axis – table (X) saddle (Y) and spindle head (Z). The error of feed and positioning against NC command of 0.001 mm resolution is less than 0.001 mm.

  Less than 0.001 mm accuracy can be achieved because:
  - ● All slideways are hardened and ground and opposite surfaces are covered by almost friction free fluoride plastic, which prevents from any overhang.
  - ● All ball-screws are located in the center of sliding ways.
  - ● Special coupling (System) with almost no backlash is employed for connection of ball-screw and D.C. servo motor.
  - ● No stick-slip and snake-move are occurred in the feed of table, saddle and spindle head due to those unique construction.
- ★ Less thermal deflection due to low temperature rise and cooling air circulation out of machine assures the accuracy stability for continuous operation.
- ★ All operating switches/buttons are divided into two groups according to their operating functions and frequencies and placed within each reach of the operator.
- ★ The table T-slots are provided transversely instead of longitudinally for convenience of chip and coolant disposal and workpiece clamping arrangement.
- ★ The latest Fanuc 6MB control unit is equipped as standard.



Planomiller
Model OPM-711

Kotobuki Industry Co., Ltd.

Features

- The cross rail is fixed securely with the column, both of them have sufficient rigidity. And so, the accuracy of squareness is very superior at the both planes of horizontal and vertical plane.
- Rail-head is ram type, and is put into the saddle by rational method. And it does long precise travelling vertically on the saddle.
- This machine can cut accurately right angled plane to the table surface by means of angle attachment set tightly to the spindle nose of the rail-head.
- Each of table feed, rail-head cross and vertical feed can be varied infinitely on the pendant switch box by D.C. motor.
- In addition to all kinds of milling work, boring work of top surface and four side face of the workpiece can be done precisely.

Standard Accessories

Handles and wrenches, Foundation bolts and leveling bolts, Arbor for 150mm (6") dia. cutter, Centering plugs, Draw-in bolts, Cutter fixing bolts, Lighing device for working, Tool cabinet.

Optional Accessories

Quill feed equipment of column head, Angular attachment, Universal angular attachment, Coolant equipment, Optical measuring device, Digital read-out device with MAGNE SCALE, A variety of arbors, A variety of automatic cycles.

Standard Accessories

Handles and wrenches, Foundation bolts and levelling bolts, Arbor for 150 mm (6") dia. cutter, Centering plugs, Draw-in bolts, Cutter fixing bolts, Lighting device for working, Tool cabinet.

Optional Accessories

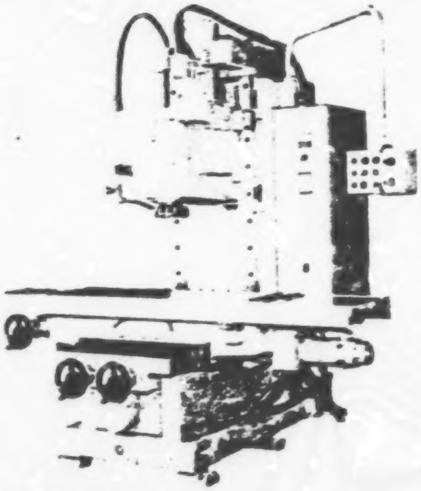
Quill feed equipment of column head, Angular attachment, Universal angular attachment, Coolant equipment, Optical measuring device, Digital read-out device (with MAGNE SCALE), A variety of arbors, A variety of automatic cycles.

Model KMV-450
Bed Type Vertical Milling Machine

Kotobuki Industry Co., Ltd.

Features

- The saddle is lengthened to minimize over-hang of table, so it ensures high durability and makes possible highly accurate machining.
- Mountain-shaped telescopic covers made of sheet steel are located at the rear of saddle, and thus enables easy removal of dust and chips.
- All handwheels are located at the front of machine to give highly superior operative function.
- Ball screws are adopted for each feed screw, so manual feeding operation can be done smoothly.
- Each feed equipment is provided with D.C. motor, so feed rates are infinitely variable.



Specifications

Main body

Table width	450 mm
Table length	1,400 mm
Table longitudinal travel (X)	1,000 mm
Table crosswise travel (Y)	400 mm
Head travel (Z)	500 mm

Specifications for Planomiller Model OPM-711

Series	18	25	30	36
Table width	750 mm			
Table length	1800 mm	2500 mm	3000 mm	3600 mm
Table travel	1750 mm	2450 mm	2950 mm	3550 mm
Table working surface	750 mm x 1500 mm	750 mm x 2200 mm	750 mm x 2700 mm	750 mm x 3300 mm
Bed length	3710 mm	5110 mm	6110 mm	7310 mm
Loading capacity	2.5 tons	3.5 tons	4.0 tons	4.5 tons
Floor space	3100 mm x 5530 mm	3100 mm x 6750 mm	3100 mm x 7750 mm	3100 mm x 8950 mm
Net weight (about)	11 tons	13 tons	14 tons	15 tons

Distance from spindle nose to table top	100 mm – 600 mm
Distance from column front to spindle centerline	475 mm
Height of machine	2,650 mm
Floor space	3,400 mm x 2,300 mm
Net weight approx.	4,800 kg
Feed equipment	
Range of feed rates (X, Y)	0 – 4,000 mm/min
Range of feed rates (Z)	0 – 4,000 mm/min
No. of feed rates (X, Y, Z)	infinitely variable
Rapid traverse (X, Y)	6,000 mm/min
Rapid traverse (Z)	4,000 mm/min

RB Series
Precision Vertical Boring and Milling Machine

Shin Nippon Koki Co., Ltd.

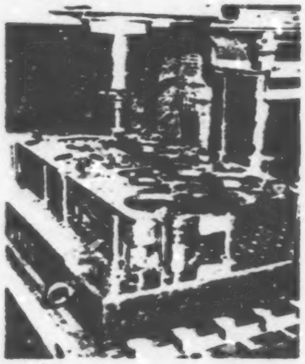
Designed to meet customer's requirements based on previous 1,500 units' experience with reliability a special characteristic

Main Features

- Advantages of Vertical Type
  - High accuracy due to the stable center of gravity of the workpiece
  - Easy set-up
  - Can be used as a production jig borer
- A variety of options (e.g. Automatic work changer)
- Can be provided with any NC system at customer's request

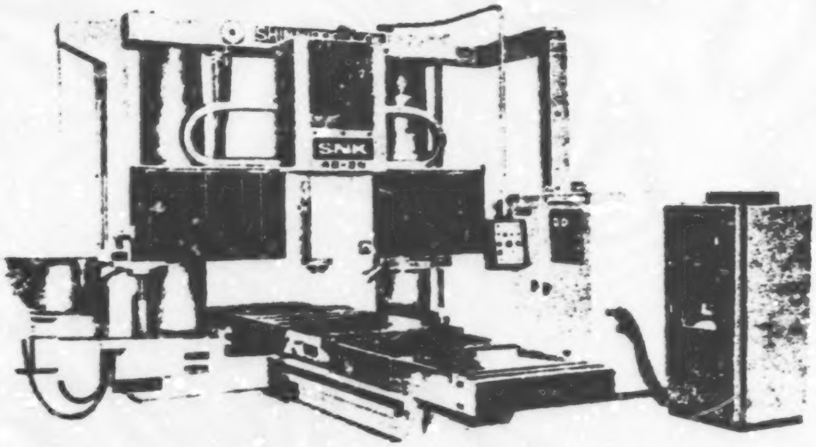
Specifications for RB-2N

Effective distance between columns	1,650 mm
Table working surface	1,200 mm x 2,000 mm
Distance, table surface to spindle end	1,300 mm
Max. table load	5,000 kg
Table travel (X)	2,350 mm
Spindle head travel (Y)	1,600 mm
Spindle quill stroke (Z)	400 mm
Crossrail elevating travel	1,000 mm
Rapid feed (X, Y)	7,200 mm/min
Rapid feed (Z)	3,600 mm/min
Cutting feed	1 – 3,600 mm/min
Spindle speed	30 – 2,000 rpm
Spindle/quill diameter	100/185 mm
Spindle nose taper	AST No. 50
Spindle drive motor	DC 22 kw



Options

Automatic tool changer Tool storage capacity:	24
Spindle speed:	30–3,000 rpm (with DC motor)
Others:	Automatic work changer. Chip conveyor. Can be provided with any NC system at customer's request. Adaptive control device. Thermal displacement compensator. Self-diagnosis function. Tool break detector. Number of tools stored in magazine up to 40.



TOMEC Series TMC-3, TMC-4
CNC Lathe

Nakamura-Tome Precision Industry Co., Ltd.

Heavy Duty Precision Spindle to Assure Rigidity

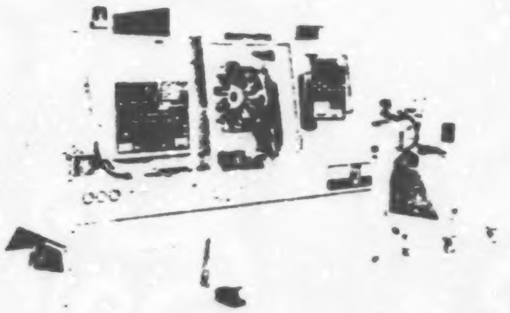
This portion carries an aspect which makes Nakamura-Tome first again. A rigid spindle of large diameter has two-point suspension for the very highest rotational accuracy: The spindle is supported by a pair of angular contact bearings and super-precision double-row cylindrical roller bearings in the front and super-precision double-row cylindrical roller bearings in the rear.

Rugged Box-Type Headstock Houses No Speed Gears

All speed gears are isolated from the headstock. The absence of gears in the headstock makes for temperature stability and quiet operation; This unique design virtually eliminates the inaccuracies inherited from heat and vibration to be generated in headstock gearboxes. The final spindle drive from the main motor through the transmission unit separately furnished via multi vee belts guarantees smooth rotational stability even at the highest speeds and heaviest cutting loads.

DC Spindle Drive to Suite Your Exact Job Requirement

The optimum spindle speed is selectable through an SCR controlled DC Motor with auto-shifting transmission unit. This arrangement optimizes individual cutting efficiency through rpm with due torque or sufficient power to meet with production needs. The infinitely variable DC motor also provides the facility of constant surface speeds in combination with a highly sophisticated CNC function increasing tool life and giving consistent surface finishes.



TMC-3

Massive Torque-Tube Bed for Stability

The strong "Torque-Tube Bed" ensures high rigidity of TMC-3 and TMC-4 and allows "chatter-free" turning without risk.

The slideways are hardened and ground and coated with "TURCITE B," Fluorine type plastic which makes the constant machining of top quality parts possible.

12 Tools on Massive Disc Turret Designed Unique to Minimize Setup Time

Each tool holder is easily mounted on a disc type turret by fastening only one screw. This quick-change tooling minimizes setup time. A precision curvic coupling ensures super accurate positioning and powerful hydraulic clamping is provided for heavy cutting loads. The bi-directional indexing turret always takes the shortest route to the next station.

Powerful Slide Feed Unit

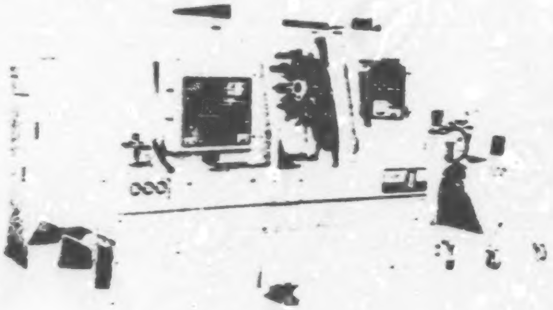
The reliable high-torque DC servo motors and massive ball screws are mated to provide the maximum thrust required for large bore drilling and for high speed turning with ceramic tools.

Compact Design for Easier Operation

Operator's panels, swing-out type, are designed to allow easy access to the operator. Also provisions have been made for instant identification of the cause of any malfunction as well as for fast and simplified repair.

Slant-Bed for Easier Chip Disposal

The 60 degree slant bed design allows easy chip disposal and provides ideal operator access for chuck loading and unloading. The chip tank which is located away from the bed ensures there are no problems with temperature increases from hot swarf. An optional chip conveyor is available along the front area with no infringement on operator's access for operation.



TMC-4

Options

Slide-In Type Tailstock: This hydraulically actuated and tape controllable "Slide-In" type tailstock allows instant machine conversion for shaft work.

Parts Unloader: This attachment, hydraulically operated and programmable, carries the cut-off workpiece away from the machining area automatically onto the chute.

Model LC30

Numerically Controlled Lathe

Okuma Machinery Works Ltd.

Easy Loading. Easy Tool Changing. Easy Chip Handling.

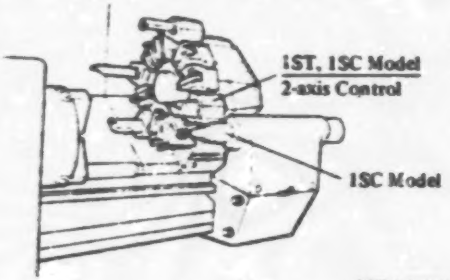
Bet you can't find a bigger or better 12-station turret in its class. Enough well-supported tools to tackle practically any job, skip-indexing in either direction with an ultra-accurate coupling, and plenty of power – 22 KW 30 min. rated DC drive – for real metal hogging, plus constant surface speeds for fine finishes in practically any material!

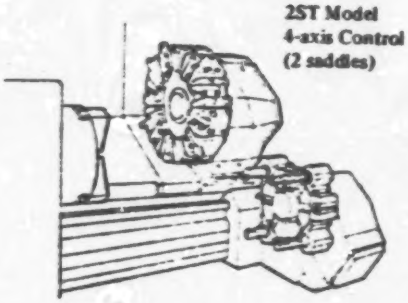
The extreme structural rigidity guarantees massive, precise cuts without a shudder.

All in a downsized, spacesaving package together with Okuma's world-renowned CNC (OSP 3000L). If you need flexibility, tremendous capacity and extraordinary ease of operation, the answer is Okuma.

The LC30 series offers powerful chucking in a convenient 2-axis control model, the 1ST.

A tailstock is available as the 1SC model. The 2ST model of the series features simultaneous 4-axis control for twice the productivity from 2 saddles.





Features

- V12 Big Turret
- Complete flexibility from 12-station permanent set-up saves time and slashes costs.
- Consistently powerful, stable cuts from heavy-duty clamping system 4500 kg with large diameter coupling.
- Time-and moneysaving skip-index system insures maximum uptime. No "station" stops along the way.
- Indexes in either direction. Indexing time: 2 sec. (face to face)

- Poweful DC Drive Motor

The husky main motor (DC 22 kw) provides powerful drive for shorter chucking time and longer tool life. Standard-equipped on the 2-saddle model (2ST) is a DC 30 kw motor. All the muscle you need for real hogging.

- 3-Point Spindle Support

The 3-point spindle support developed by Okuma has been acclaimed for the tremendous rigidity it offers across high speeds in heavy hogging. Double-row Cylindrical Roller Bearings and Angular Thrust Ball Bearings insure stable cuts at up to 3000 rpm. The 77 mm spindle bore enables you to handle bar work too.

Spindle dia.: 120 mm
Spindle bore: 77 mm

- Rugged, Rigid Bed Construction

This special Okuma designed slant bed and overall construction are solid throughout. Chips fall directly from the cutting point or bed to the optional chip conveyor below. The distance from the spindle center to bed sliding ways is minimal despite the size of the massive 12-station turret.

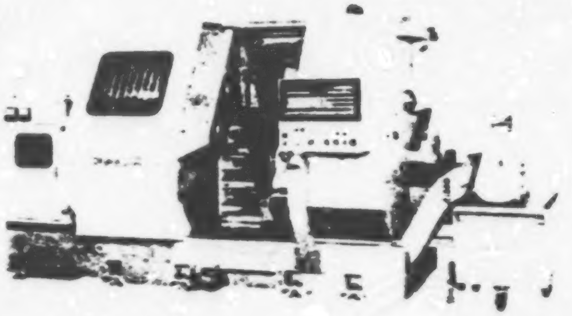
- Extreme Precision – Maximum Accuracy Always
- X, Z ways are ground and hardened, with force-feed lubrication, so as to maintain high accuracy under hears of heavy operation.

- Pinpoint positioning accuracy from ultraprecise ball screw action.
  Force-feed lubrication for long life.

- Consistently close tolerances are possible because of the standard output increments of 0.001 mm on either axis (X,Z). (Tape input: 0.01 mm)

- High indexing accuracy, despite large turret size, close tolerances from use of very precise coupling action.

Slide Repeatability:	X axis . . . . . ±0.001 mm
	Z axis . . . . . ±0.002 mm
Slide Thrust (15 min. rating):	X axis . . . . 850 kg
	Z axis . . . . 1500 kg
Turrets Index Accuracy:	±1.5 seconds of arc
Turret Clamping Force:	4500 kg
Turret Index Speed:	2 seconds per position
Max. Allowable Weight on Spindle, incl. chuck:	180 kg (chucking work)



Model LC20-2S
4-Axis CNC Chucker

Okuma Machinery Works Ltd.

- 16 tools for virtually unlimited turning flexibility multiple-lot work.
- Simultaneous OD/ID cuts on 2 independent slides.
- NC robot for automatic setup and removal of various work.
- Auto work gaging system for tool offset automation and control of work dimensioning.
- Safe, continuous operation, thanks to Okuma Monitoring Systems.
- Full flexibility from the new Okuma OSP3000L CNC

The OSP3000 is a minicomputer-based CNC series featuring not only the conventional NC functions but many other unique Okuma systems. Controlling the machine through a full array of cost-efficient software, this OSP3000L can be expanded, continually updated and adapted in terms of diverse specifications.

Specifications

Swing over bed	ϕ400mm
Max. turning dia. x length	ϕ300 x 230 mm
Type of spindle nose	ASA A2-6
Spindle bore diameter	ϕ52 mm
Number of spindle speeds	Stepless x 2 (Auto)
Range of spindle speed	65 to 3500 rpm.
Rapid traverse speed, X-axis	5 m/min.
Z-axis	10 m/min.
Type and No. of tool stations	Auto. vert. V8 + V8
Main motor	DC 15/22 kW (Cont./30 min.)

Try this cost-efficient Okuma programmable robot. Ideal for multiple medium- or small-lot production.

The machine/control-unitized robot and turntable combination provide automatic setup and removal of different types of work. The savings in time and labor are immense.

- Minimizes setup and removal time.
- No congestion at front of machine. Allows complete operator access as desired.
- Programmable robot arm offers a wide selection of positions to fit with any process.
- Your choice of horizontal attitudes, positioning heights.
- Extremely easy, flexible maneuverability from tape operation and teach control (playback). Easily taught on the job.
- Simple robot movements from the turntable.
- Fully unitized control of the machine and robot operations under Okuma's own OSP 3000L CNC control.

Okuma Robot Specifications

Load capacity
5 kg x 2, 10 kg x 1 (Chuck work: usually double hand)
Workpiece size
ϕ20– ϕ150 x 120 mm (Chuck work)
ϕ20–ϕ100 x 500 mm (between-centers work)

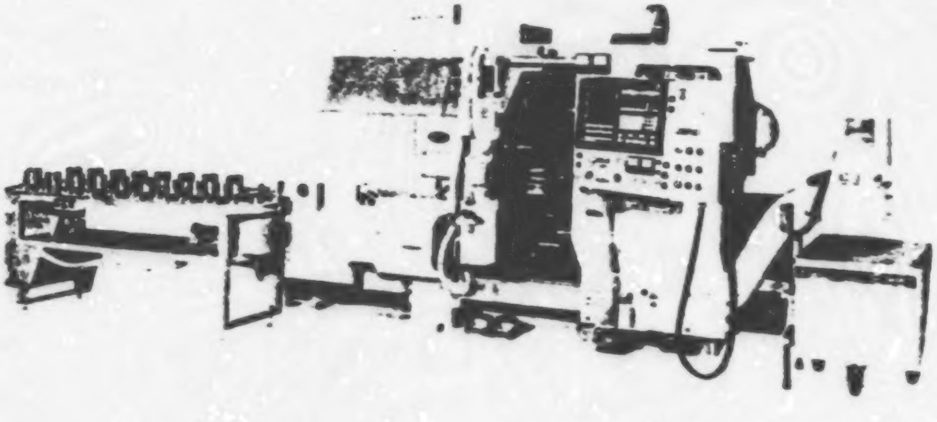
Accuracy

Positioning accuracy	±0.15 mm
Absorption of eccentricity	±1 mm
Absorption of deflection	±1.5°

Automatic Work Gaging System

The superlative Okuma gaging system can provide fuller automation for long or short runs. Okuma's outstanding reliability, innovative and rich array of software are the reasons why this efficient measuring system brings the day of full automation a giant step closer.

- The work gaging system using the unique touch sensor works off the Okuma OSP absolute coordinate system. Thus, high reliability is achieved without the need for a special detector (magnescale, inductosyn, etc.).
- Just one gaging head is used to measure workpiece OD, ID and end face. And the high-precision sensing switch and switch for over travel protection have a very simple, built-in construction.
- The OSP software handling provides immediate feedback of the measured data. The results are translated directly into accurate offsets. No manual operations are needed to measure.



NCT COMA Series

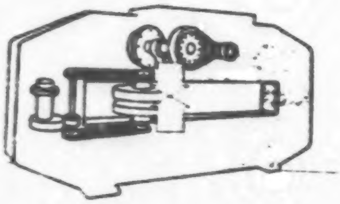
Triple Track Turret Punch Press

Amada Company, Ltd.

Turret Punch Press with "Yaw-Free" Bridge Frame Construction

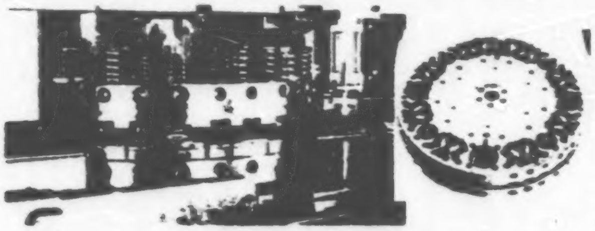
The COMA press frame is a bridge-type, welded steel design, closed at the sides. This frame resists without deflection the opposing forces arising during operation and eliminates the "yawing" usually associated with C-shape frames. The results are extreme accuracy and considerable lengthening of the tool service life.

In addition, no special foundations are required for COMA series presses – an additional advantage resulting from the design of the frame.



Triple-Track Turret with 32 to 72 Tool Positions

The triple-track turret can accommodate up to 72 standard tools. When set up for the production program in use at any given moment, it is possible to execute most operations without extensive interruptions for tool-changing.



Number of tool positions in turret.

Tool diameter (mm)	standard	option			special option		
152.4ø	–	–	–	–	–	1	1
114.3ø	2	2	2	4	2	2	1
88.9ø	2	2	4	4	2	3	4
50.8ø	4	4	4	4	6	4	4
31.7ø	16	24	20	8	24	12	16
12.7ø	48	24	12	12	18	24	18
Total number of positions	72	56	46	32	52	46	44

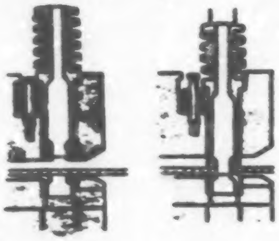
The turret can rotate in both directions so that the shortest, and thus the quickest, path from momentary tool position to work position can be selected.

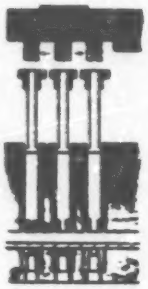
Tool and Tool Guide

The punch and die, exactly aligned, represent a single unit. This along with the long tool guides and in conjunction with the stable bridge frame construction (no deflection) results in unusually long service life for the tools.

The tools are manufactured from high-alloyed tool steel and can be resharpened without difficulty. The adjustment feature on the punch head makes it possible to maintain proper punch height after sharpening.

The punch guide fixes the blank in place before the actual punching operation is begun. After completion of the punch cycle, the tool is first retracted from the blank followed by the tool guide. This is particularly advantageous when punching thin sheeting at close intervals.



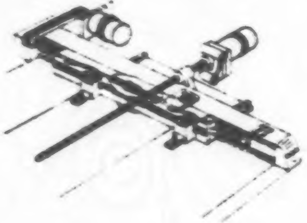


Tool Track Selection

The selection of the tool track is pre-programmed when punching the paper tape and thus is regulated automatically during operation. A double-action pneumatic cylinder positions the ram striker over the desired track. Safety switches keep the ram from striking unless it is correctly aligned.

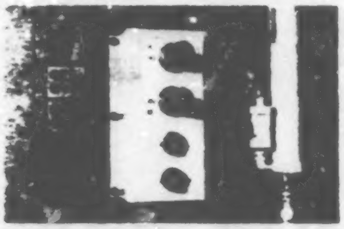
DC Servo Motors

The blank is positioned exactly for punching by means of DC servomotors which position the work table, which is suspended in two linear ball bearings. The entire table rests on tempered dovetail guides.

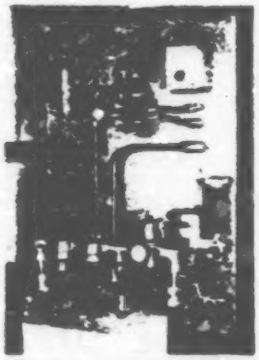


Tool Lift

To make it easier for the operator to change out the larger tools, a pneumatic lift is provided over the tool change point. A slow adjustment speed is provided to lower the tool gradually into the turret guides.

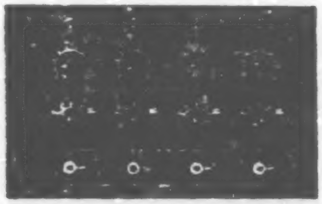


Defect Locating System and Automatic Centralized Lubrication



The number of strokes of the tool is tabulated by an adjustable counter. After the pre-set value has been reached, all critical parts such as crankshaft bearings, turret bearings, ram, etc., are automatically lubricated.

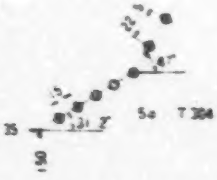
The economic effectiveness of an NC machine is based on its efficiency. In order to keep efficiency as high as possible, the models in Amada's COMA series are equipped with a defect diagnosis system. Each sub-system connected to the machine's cable harness can be checked individually.



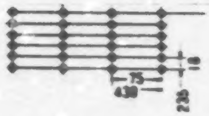
CNC Control

The COMA triple-turret punch presses utilize computer numerical control. CNC makes for far greater flexibility in comparison to "hard wired" NC systems; quick and simple re-programming are additional advantages of this design. The need for long, complicated programs is eliminated with CNC control. The computer executes all calculations and considers the track positioning of the ram striker.

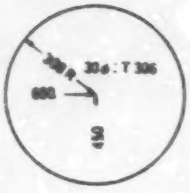
The following programming examples show how uncomplicated the basic programs are.


22.5°
45°
22.5°
35
5φ
T 304
50

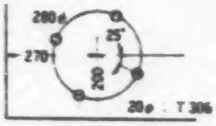
```
G 28 I 1500 J 3120 K 5 T 304
G 28 I 2250 J 4700 K 2
```



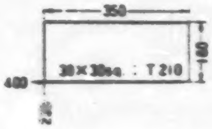
```
G 37 I7500 P 3 J1800 K 5
```


300φ
30φ : T 306
600
450

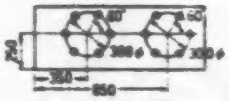
```
G 68 I30000 J9000 K 36000
P3000 Q 600 T306
```


200φ
25°
270
200
20φ : T 306

```
G26 I 14000 J 6500 K4 T306
```


350
160
30 × 30sq. : T 210
400
235

```
G 67 I 35000 J16000
P3000 T 210
```

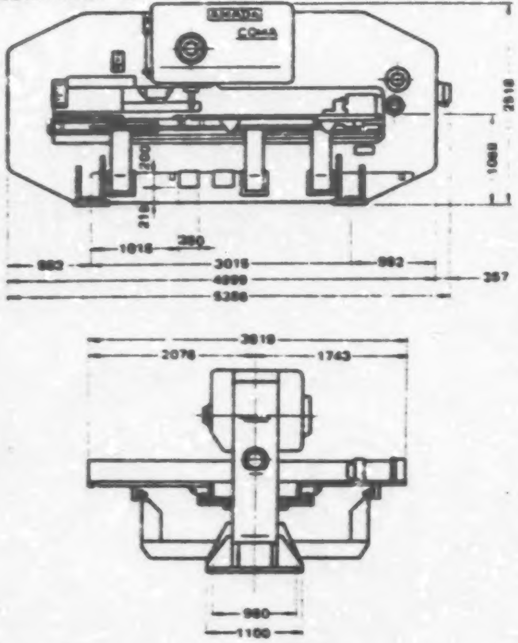

60°
60°
300φ
300φ
250
350
850

```
A1G26 I 15000
J0 K6 T203 (10∅)
G 72 X85000
B1
```

In addition to above basic programs, the multiple product punching function which increases the productivity of small products is available as a standard software.

Technical Data for COMA Triple-Track Turret Punch Press

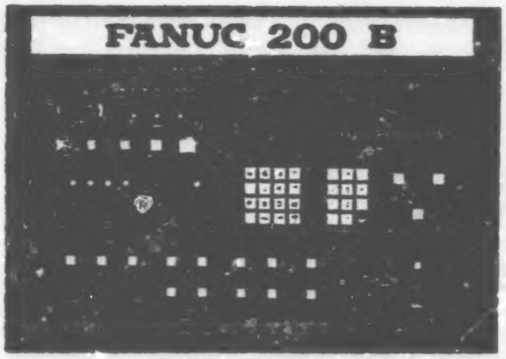
COMA 50 60 72


AMADA
COMA
2518
1060
200
210
1016
280
982
3016
982
4999
357
5286
3819
2076
1743
980
1100

Specifications

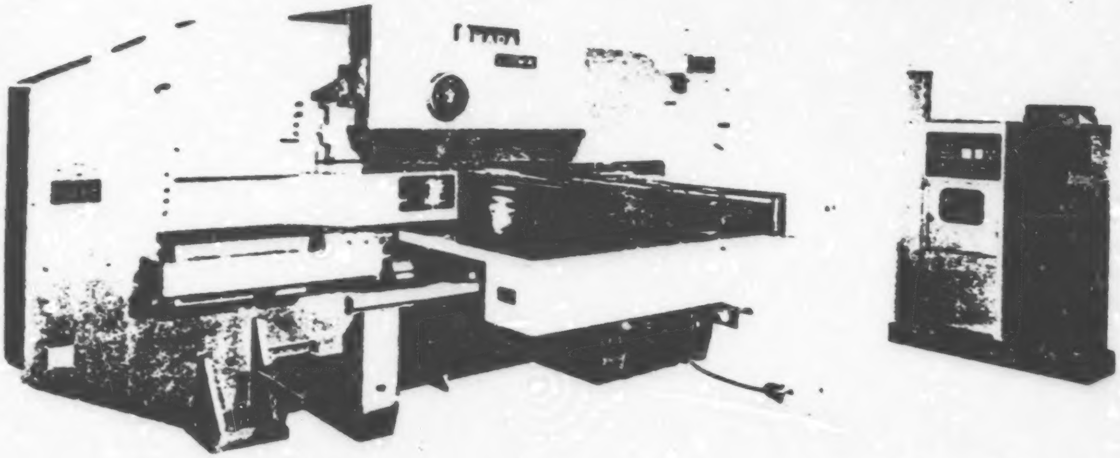
	COMA-50-60-72	COMA-50-50-72	COMA-50-50-50
Capacity (ton)	50	50	50
Max. plate size (mm)	1,525 x 3,660	1,270 x 3,660	1,270 x 2,540
Max. plate thickness (mm)	6.35	6.35	6.35
Positioning accuracy (mm)	±0.15	±0.15	±0.15
Turret tool capacity	72	72	72
Table travel speed (m/min)	50	50	50
Hits per minute (on 25mm moves)	200	200	200
Turret speed (rpm)	30 (bi-directional)	30 (bi-directional)	30 (bi-directional)
Ram strokes per minute	300	300	300
Automatic repositioning	standard	standard	standard
Compressed air supply (kg/cm²)	5.7	5.7	5.7
Machine weight (ton)	16.5	14.5	14.0

CNC Specifications



Model: Fanuc 200-OB
Memory capacity. . . . . 16 kw (standard)
Dimensions . . . . .1000 mm long x 500 mm deep x 1760 mm high
1 set, control cabinet . . . 960 mm long x 500 mm deep x 1760 mm high

Number of simultaneously controlled axes . . . . . . 3 axes
Programming format . . . EIA or ISO code, standard, with 8-track paper tape
Programme mode. . Incremental and absolute, integrated
Smallest input increment . . . . .0.01 mm
Max. programmable dimension. . . . . .99,999.99 mm
Sequence number 3-digit
Paper tape code. . . . . EIA, ISO word address system
Punch functions . . . . .G 2 digit
Tool functions . . . . T 3 digit
Auxiliary functions .M 2 digit
Manual input . . . . Direct at control console
Paper tape reader. . . . . Photoelectric, 200 characters/sec.
Zero-point return . . . . Manual with push-buttons or through programmed order
Block check . . . . With check bit on paper tape
Block skip . . . . Switched at control console
Warning signals . . . . Programme error, Excess temperature, Overtravel, Servo alarm, Sequence error

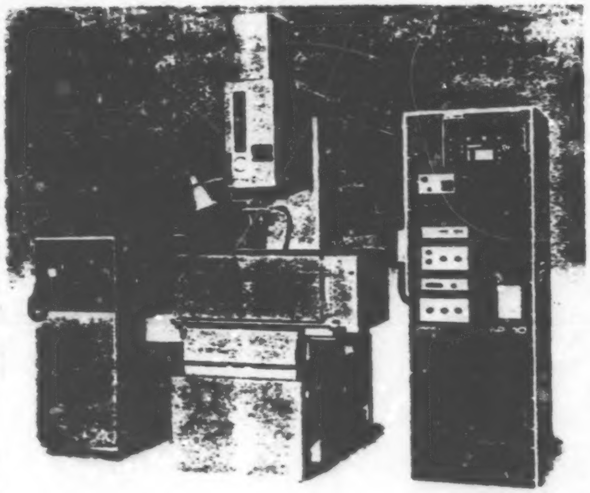


Electric Discharging Machine

Model DP35B with JAPT-02P

Precision EDM Machine

JAPAX Inc.



3-Axis Digital Control with Latest Technologies and Concepts for High Performance NC Operation

The equipment also includes the JAPT-02P, an NC equipment rich in novel functions including playback function, realizing full automatic NC-EDM.

Main Features

- Playback function is the core of automation in machining setup and unattended operation.
- Side machining, enlarged machining, and taper machining made easy.
- The M function, commanding operations other than NC feed of the table, has realized full automatic operation with such functions as commanding ON-OFF of electrical discharge, calling of machining conditions, ON-OFF of dielectric fluid, etc.
- Automatic contact positioning function frees operators from exacting positioning work.
- Automatic origin return function.
- Equipped with MYSEL II program controlled EDM Data Analysis and Processing Unit.

The flow of operations is substantially changed by state-of-the-art NC equipment.

Effect of NC-EDM (JAPT-02P NC Unit)

Alignment electrode changing: Fast and accurate alignment made possible by the presetter. Automatic electrode changing by the AEC (optional).

Positioning: Automatic positioning by centering function and automatic edge finding function permit high accuracy 1µm/step positioning. Return to reference point is also made easy by the origin return function.

Selection of machining conditions: The automatic reciprocation control, current density control, and presetting function of machining conditions by the MYSEL II permits programmed selection of machining parameters during continuous automatic operation. Maximum steps of selectable programs: 8 steps.

Axial control: Efficient side machining. Programmed path can be enlarged, contracted or tapered.

Modification of machining results (Effect of playback function): Easy measurement during/after machining. Correction of dimensions is easy using the playback function.

Electrode generation & modification: Electrode modification by reversed discharge. Small-diameter electrode can be generated with the spindle head (option) and the X-Y servo.

Programming: MDI and paper tape input. Playback input is without programming. Dwell input for each block. Continuous automatic operation of complex processes and multiple jobs. 120 hrs memory function for power shutdowns.

Specifications

(Unit: mm)

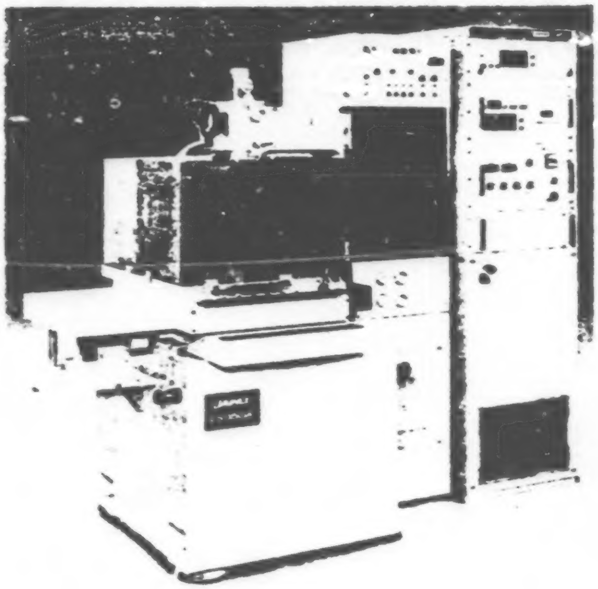
Model	DP10	DP20	DP35B	DP55	DP85
Work table (W x D)	350 x 240	420 x 260	600 x 350	700 x 500	1,000 x 700
Work tank (W x D x H)	500 x 340 x 200	550 x 360 x 200	800 x 500 x 300	1,200 x 750 x 500	1,900 x 1,050 x 700
Table traverse travel	200	250	300	800	1,300
Table longitudinal travel	100	150	200	400	600
Ram servo travel	(Servo) 80 (Manual) 150	(Digital servo) 200	(Digital servo) 250	(Digital servo) 250	(Digital servo) 450
Maximum electrode weight, kg	10	15	75	150	500
Outside dimensions (W x D x H)	925 x 955 x 1,880	880 x 850 x 2,010	1,325x1,400x2,415	1,800 x 1,500 x 3,000	3,380x2,750x3,830
Net weight, kg	600	700	1,400	4,500	9,500

Model LS350A
High Accuracy, Low Cost Wire-Cut EDM Machine

JAPAX Inc.

High stability, high performance mechanical characteristics assure high accuracy yet easy operation

The LS350A features high accuracy and high stability mechanical constructions built to permit easy operation. Highly systematized various functions, represented by such units as the Control Unit JAPT3E, in which high level functions are standardized, and the JAPT Auto Programming Unit JAPT2A/E, which offers software of new concept, have been evolved about LS350A Wire-Cut EDM Machine.



Pursuit of High Accuracy

- An Accurate NC Table

Precision roller guides and ball screws transport the workpiece positively. Rugged construction easily supports heavy loads. Large diameter ball screws and quality roller guides maintain constant accuracy over long operations. (Ball screws are supported at both ends to provide rigidity.)

- Drive System

Motor movement of 1μm (40 microinch) increment is detected to insure accurate and smooth machining.

- Lead Screw Pitch Error Compensation

Workpiece is measured at the actual setup position, permitting correction of positional errors.

- Rigid Workpiece Table

Even when a heavy workpiece is loaded and clamped tightly, the rugged table exhibits no displacement. It accurately maintains the workpiece position over a long time span.

- Uniquely-shaped sapphire wire guides retain the wire laterally in all directions.

They are made of low friction material and are spaced to prevent any appreciable slack of the wire. These features permit large accurate taper angles to be readily machined. The guide mechanism permits easy operation and sufficient flushing without affecting the stable wire running.

Pursuit of Easy Operation

Digital Display

The X, Y table movement is displayed in the increment of 1μm. By means of a selector switch, block No. and table speed during machining are displayed, enabling an operator to know machining condition at a glance.

Pursuit of Stability

- Continuous Stable Machining

Japax's Clear-Cut unit, peerless in the world, does adaptive control according as gap condition, permitting high accuracy and many hours' stable, yet high speed continuous machining.

- Rigid Upper Arm

The upper guide moves vertically according as workpiece thickness. With high accuracy roller guide and spring balance mechanism, the guide moves smoothly and accurately for a long period of time.

Specifications

(Unit: mm)

Model	LS250A	LS350A	LS500A	LS800A	LS1000A
Maximum dimension of workpiece (W x D x H)	400 x 300 x 100	400 x 500 x 120	500 x 600 x 150	1,000 x 600 x 150	1,200 x 600 x 150
Maximum weight of workpiece, kg	100	200	300	600	800
Table traverse travel	150	250	300	500	500
Table longitudinal travel	250	350	500	800	1,000
Table displacement minimum unit	0.001	0.001	0.001	0.001	0.001
Outside dimensions (W x D x H)	1,070 x 960 x 1,660	1,365 x 1,110 x 1,676	1,625 x 1,530 x 1,745	2,305 x 2,060 x 1,650	2,305 x 2,660 x 1,650
Net weight, kg	800	1,300	1,800	4,200	4,800

Leading Manufacturer of Lathe Chucks

Kitagawa Iron Works Co., Ltd.

Since our company had been established by the present chairman, Mr. Jitsuo Kitagawa as a private company in 1918 and succeeded into the incorporation in 1941 as Kitagawa Iron Works Co., Ltd., we have made rapid progress broadly in three divisions of the machinery (construction and machine tools accessories), the iron casting (mechanite cast iron) and the housing (prefabricated houses and housing site preparation) over forty years. The sales amount for the 1981 fiscal year (Sep. 21, 1980 to Sep. 20, 1981) is going to exceed largely the estimate 27 thousand million yen.

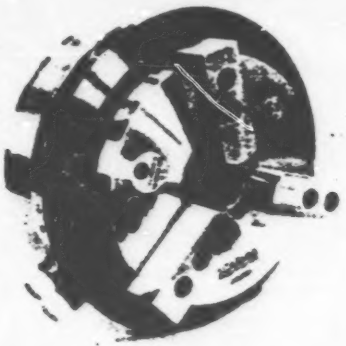
We have six plants, namely head office plant, Tokyo and Wakayama plants as a machinery plant, Shimokawabe and Nakasu plants as a cast iron plant and Kozan plant as a prefabricated house plant, and newly-built Motoyama plant will start in operation on September 1981 as a lathe chuck special plant for the exportation mainly. In each factory a lot of machining centers and industrial robots are now in work and under the high quality and the mass production, all about 1300 employees deliver the KITAGAWA-brand superior products toward all over the world market. In particular, our company proves the competitive price and the higher quality to be a leading maker of machine tools such as various lathe chucks including manual and power chucks, various NC-rotary tables including precision indexing heads, in addition pallet changers relating to a machining center, in the world market as well as in Japan.

On convenience of paper, we will explain as below with a limit to the main products in relation to the exportation which gain popularity from the abroad.

The management and staff at Kitagawa are dedicated to contribution with Kitagawa own precision machine tool technics in this most expectable field for the enlargement of future business. Your sustained support and patronage will be welcomed.

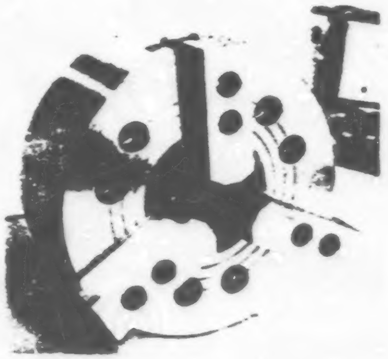
Air Operated Universal Front-end Chuck
Model UVE-K

UVE160K (6") to UVE800K (32") are made in series and moreover the large dia. thru-hole chuck, of which jaw stroke is no less than 1 inch, is manufactured with a large lot for machining threads of oil digging pipe. We are ready to response them as soon as you contact us if you have some inquiries about the lathe chucks.



High Speed Thru-hole Power Chuck
Model HOB

Using the special alloy on all the chuck body and jaws, making an induction hardening on the body sliding face and grinding them completely, this chuck is designed and manufactured with the carefull attention to the accuracy maintenance and the durability. Moreover the stable maintenance of the high gripping force in high speed rotation is characterized remarkably.

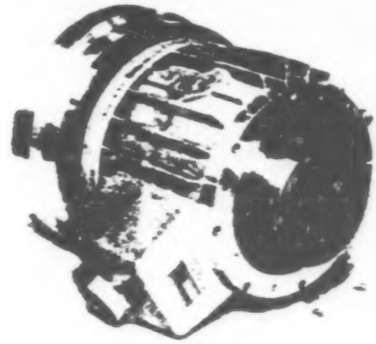


Ultra High Speed Thru-hole Power Chuck
Model HOH

To keep the gripping force in the range of ultra high speed rotation, this chuck incorporates the counter balance weight, by which the reduction of the gripping force by centrifugal force can be compensated. On HOH-6 (6", center bore 33mm), the max. revolution can attain to 6700 rpm.

Ultra High Speed Thru-hole Hydraulic Cylinder
Model F

It is the F type ultra high speed cylinder which has been developed for HOB type high speed thru-hole chuck and HOH type ultra high speed thru-hole chuck. This cylinder has the self-coolant system by means of the incorporated fan and accordingly it is unnecessary to furnish the oil coolant device separately. This makes a remarkable fall in the investment cost possibly.

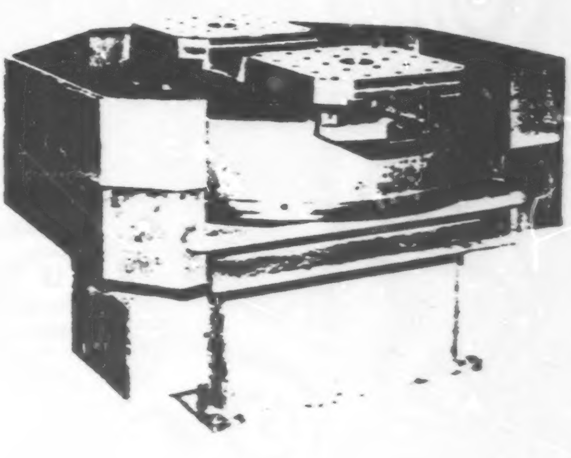


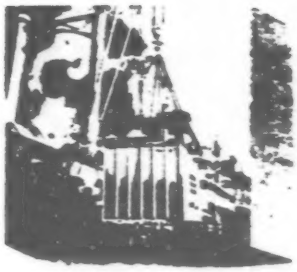
NC-rotary Table Model NRT
Control Unit for NC-rotary Table Model MAC

Over the wide range of the table dia. from 250mm to 1250mm. NC rotary table series are manufactured completely as a standard type. The spindle bearing gets the excellent high rigidity due to its special structure and the worm gear is of the highest class, adopted with large module, large dia. and double lead worm. Indexing accuracy is within ± 2 sec. Additionally the use of control unit of SUPER-MAC could perform the accuracy within ± 5 sec. due to its compensating mechanism. The control unit SUPER-MAC is the low cost and reliable single spindle NC equipment developed for the exclusive use of NC indexing table.

Pallet Changer and Pallet Magazine

Our company, as a machine tool maker concerning a machining center, is also designing and manufacturing various kinds of pallet changers and pallet magazines for the vertical as well as the horizontal machining besides NC rotary table.





CSO: 4120/74

CURRENT TRENDS OF MACHINERY INDUSTRY

Tokyo DIGEST OF JAPANESE INDUSTRY AND TECHNOLOGY in English No 164, 1981 pp 82-88

[Article by Shigenari Tsuruoka, Economic Research Institute, Japan Society for the Promotion of Machine Industry]

[Text]

Current Status of Japanese Machinery Industry; International Comparison

Comparing the statistics of Major Nations, current status of Japanese machinery industry will be presented in my lecture. Oil crisis in 1973 hit the world to slow down the economic growth of leading nations, including Japan, as the Table 1 shows. It is, however, pointed out that Japanese economic growth in average for the 1973-79 period marked the highest among those leading nations. This fact contributed to the consolidation of the Japanese machinery industry. It is the period when even Japanese businessmen were fully conscious of comparative strength of the Japanese machinery industry. Generally it is said that the Japanese machinery industry is competitive in the international market. And the value of the Japan's machinery export amounted to as much as 61 percent of her total export value in 1979 (see the Table 4). The transportation and electric machinery are major sectors for the export market.

Japan's industrial structure is in the process of further changing. In 1975 the portion of the machinery industry in the Japanese manufacturing industry was 28 percent and it is estimated that in 1985 the machinery industry will account for 32.9 percent in the Japanese manufacturing industry. This could cause another trade friction, if a substantial portion of such an expanded production is to be exported.

In 1970s Japan has been experiencing the remarkable increase in its market share, while the respective market shares of West Germany and the U.S.A. have been declining. With reference to composition of machinery exports by type of production, Japan exports automobiles, ships, radio and TV sets, in the order of percentages of total export amounts.

Concerning the machinery import, Japan imports only little. According to the order of import amount, the first is electric machines such as semi-conductors and electronic parts. Also it imports other general machinery, and business machines including large-size computers.

Table 1. Economic Growth Rate in Major Nations

(Unit: %)

	Japan	U.S.A.	F.R.G.	U.K.	France	Italy
1973	10.0	5.5	4.9	8.0	5.4	7.0
1974	- 0.5	- 1.4	0.4	- 1.3	2.8	4.1
1975	1.4	- 1.3	- 1.8	- 0.7	0.3	- 3.6
1976	6.5	5.9	5.3	3.6	4.9	5.9
1977	5.4	5.3	2.6	0.9	2.9	1.9
1978	6.0	4.4	3.5	2.4	3.3	2.6
1979	5.9	2.3	4.4	0.3	3.2	5.0
1975-79 (average)	4.0	2.5	2.3	0.9	2.9	2.6

Remarks: Japan: new SNA; U.S.A. and F.R.G.: GNP; U.K. and Italy: GDP; France: GDP based upon SNA.

Table 2. Machinery Industry in National Economy (1978)

	Japan GDP		U.S.A. GNP		F.R.G. GDP	
	1,000 million US$	%	1,000 million US$	%	1,000 million US$	%
Gross product	1,053	100.0	2,108	100.0	700	100.0
Primary industry	50	4.8	64	3.1	19	2.6
Secondary industry	595	37.5	664	31.5	289	41.3
Manufacturing industry	305	29.0	510	24.2	261	37.2
Machinery industry	105	9.9	171	8.1	102	14.5
Tertiary industry	608	57.7	1,379	65.4	392	56.1
	1 US$ = ¥194.60				1 US$ = 1.828 D.M.	

Remarks: (1) Primary industry: Agriculture, Forestry and Fishery
Secondary industry: Mining, Manufacturing and Construction
Tertiary industry: Industries other than the above
(2) Some of the numbers for U.S.A. and F.R.G. are estimates.

Growth of Post-War Japanese Economy and Machinery Industry

Japanese economy has experienced many changes after the Second World War. According to the characteristic of its structural changes, the periods will be able to be devided as follows;

1945-55: This decade was for the reconstruction

Table 3. Shipments of Machinery Industry (1977)

	Japan		U.S.A.		F.R.G.	
	Million US$	%	Million US$	%	Million US$	%
Total	183,508	100.0	404,076	100.0	142,994	100.0
General machinery	47,397	25.8	119,008	29.4	46,846	32.8
Electric machinery	56,147	30.6	85,759	21.2	39,885	27.9
Transportation machinery	71,056	38.7	170,739	42.3	50,622	35.4
Precision machinery	8,908	4.9	28.570	7.1	5,641	3.9
	1 US$ = ¥240.00				1 US$ = 2.1050 D.M.	

Remark : For F.R.G., the shipments of corporations with 20 employees or more were revised to indicate the total shipments of all the corporations on the basis of the number of employees.

of the Japanese economy to become independent. For this, the priority was given to the energy industry and the basic material industry, such as for coal, steel, fertilizers, cement and power generation. The only thing exported during this decade was textile.

1955-65: In 1956 the Japanese ship-building industry exceeded the U.K. counterpart by their production and became the biggest in the world.

In the first half of this decade, precision machinery such as cameras and watches, and household appliances such as TV sets, electric washing machine and refrigerator were extensively developed. They were replaced by automobiles and machine tools in the second half.

In this decade the Japanese economy experienced the high growth, being supported by the then-arising technological innovation. Also, the population enjoyed the large spread of consumer durable goods. And transistor radios, tape recorders, ships were exported.

1965-73: This period was characterized by the 2nd High Growth Economic period of Japan. Until oil crisis occurred Japanese economy had enjoyed the very rapid economic growth. The automotive, housing, leisure, pollution-presentation, fashion industries became steadily the major industries. Mainly exported were automobiles, office equipments and sophisticated electronics.

1973- : After the oil crisis the Japanese economy entered upon the low-growth period endeavouring to adjust it to new worldly circumstances. In this period plant engineering became rapidly the major industry with a considerable plant export.

Underlying Reason for the Strength of the Japanese Machinery Industry

Why is the Japanese machinery industry strong? This is the very question posed frequently. But it is not so easy to answer this question. Generally it is said that the Japanese machinery industry succeeded in adapting good technology, realizing high labor productivity and introducing electronics. No doubt, these elements contributed and are contributing to the strength of the Japanese machinery industry. But it is difficult to recognize how much the respective element does contribute to it.

Good technology may be divided into two aspects: design technology, production technology. Two combine to upgrade quality and function of products while they also realize the lower price. Especially after 1973, the new worldly economic condition enforced the Japanese industry to raise labor productivity. The number of female workers spontaneously leaving the company has not been replenished, otherwise industrial robots in large quantity have been introduced, which have been contributing to the higher labor productivity. To date, 75,000 robots, which is 80 percent of the number of industrial robots in the world, are operating in Japan. And it is estimated that the number will increase drastically in the coming decade.

Table 5. Long-term Prospects of Industrial Structure
– Machinery Industry in Manufacturing Industry

(Unit: billion yen)

	1970	1974	1975	1985
A Manufacturing industry	125.4	155.5	143.0	268.3
B Machinery industry	32.3	44.4	40.0	88.3
B / A (%)	25.8	28.6	28.0	32.9

Introduction of electronics into machinery industry is characteristic of the Japanese machin-

Table 4. Exports of Machinery

(1979)

	Japan		U.S.A.		F.R.G.	
	Million US$	%	Million US$	%	Million US$	%
Total export value	102,801		181,802		159,398	
Total machinery export	62,704	(61.0) 100.0	84,779	(44.6) 100.0	80,785	(50.7) 100.0
General machinery	13,850	22.1	44,741	52.8	30,506	37.8
Electric machinery	16,361	26.1	8,635	10.2	16,908	20.9
Transportation machinery	26,775	42.7	25,750	30.4	29,889	37.0
Precision machinery	5,718	9.1	5,653	6.6	3,480	4.3
	1 US$ = ¥240.00				1 US$ = 1.8329 D.M.	

Remark : Figures in parentheses are the ratios of machinery export against total export.

Table 6. Market Shares of Major Machinery Exporting Countries

(Unit: million US$)

	1965	1970	1973	1975	1976	1977
OECD	41.323	82.185	148.499	221.712	251.015	286.852
F.R.G.	25.4	20.4	22.3	19.8	20.3	20.7
U.S.A.	21.2	22.8	19.6	21.5	20.6	18.6
Japan	7.0	10.3	13.1	13.2	15.3	16.8
France	6.7	7.4	8.0	8.9	8.6	8.6
U.K.	14.0	10.1	8.3	8.6	7.6	7.9

Table 7. Composition of Machinery Exports by Type of Product

1977 (Unit: million US$, %)

	%*	No. 1	No. 2	No. 3	No. 4	No. 5
Japan	60.0	automobiles 14,653 (30.4)	ships 8,129 (16.8)	radio receivers & TV sets 5,892 (12.2)	other machines 4,282 (8.9)	optical equipment & measuring instruments 2,643 (5.3)
U.S.A.	45.3	automobiles 11,797 (22.1)	other machines 8,384 (15.7)	aircrafts 5,866 (11.0)	other electric machines 4,593 (8.6)	business machines 3,645 (6.8)
F.R.G.	50.3	automobiles 16,568 (28.0)	other machines 11,694 (19.7)	other electric machines 3,823 (6.4)	special industrial machines 3,316 (5.6)	prime movers 3,107 (5.2)
France	50.3	automobiles 7,728 (31.4)	other machines 4,029 (16.3)	other electric machines 1,573 (6.4)	heavy electric machinery 1,380 (5.6)	prime movers 1,336 (5.4)
U.K.		automobiles 4,667 (20.7)	other machines 3,517 (15.6)	prime movers 2,203 (9.8)	special industrial machines 1,844 (8.2)	other electric machines 1,471 (6.5)

*Percentage of machinery export against total export.

Table 8. Composition of Machinery Imports by Type of Product of Major Machinery Importing Country

1977 (Unit: million US$, %)

	%*	No. 1	No. 2	No. 3	No. 4	No. 5
Japan	6.8	other electric machines 738 (15.3)	other machines 735 (15.2)	business machines 603 (12.5)	optical equipments & measuring instruments 411 (8.5)	prime movers 406 (8.4)
U.S.A.	26.1	automobiles 17,529 (45.5)	radio receivers & TV sets 3,749 (9.7)	other electric machines 2,798 (7.3)	other machines 2,667 (6.9)	prime movers 2,247 (5.8)
F.R.G.	20.8	automobiles 5,019 (24.4)	other machines 2,847 (13.6)	other electric machines 2,204 (10.5)	business machines 1,531 (7.3)	radio receivers & TV sets 1,297 (6.2)
France		automobiles 3,847 (22.5)	other machines 2,953 (17.3)	other electric machines 1,559 (9.1)	business machines 1,188 (7.0)	prime movers 1,086 (6.4)
U.K.		automobiles 3,636 (23.4)	other machines 2,142 (13.8)	business machines 1,428 (9.2)	special industrial machines 1,406 (9.0)	other electric machines 1,337 (8.6)

*Percentage of machinery import against total import.

Growth of Post-War Japanese Economy and Machinery Industry

	1945 1950	1955 1960	1965 1970	Oil crisis 1975 1980
General economic condition	preparatory period for economic recovery and independence	high-growth period with the beginning of technological innovation	end of high-growth	adjustment period low-growth period
Consumption trend	sufficiency in food and clothing	spread of consumer durable goods	leisure, housing, fashion	social consumption and demand
Major industries	coal steel fertilizers electric power coal steel cotton spinning *shipbuilding cement	*household electric appliance chemical industry electric power (thermal) synthetic fiber *precision machinery petroleum industry *electronics industry *general machinery	automobile housing industry leisure industry pollution preventive industry fashion industry	systems industry information industry plant engineering
Industrial foundation	basic material and energy industries	technological innovation industry assembly industry	information and system industry, energy-conservation and energy industry plant	
Major export commodity	textile products	*shipbuilding steel * camera *sewing machine *transistor radio *TV sets *tape-recorder synthetic fiber	* automobile *office equipments * electronics	automobile bearing plant
Characteristic of labor	labor-intensive	technology and labor-intensive	technology and knowledge-intensive	

Remark: * indicates the machinery industry ery industry. It has contributed to upgrading products. For instance, as much as 20 percent of production cost of the automotive industry is spent for electronics. Other examples include calculators, sewing machines, scales, cash registers, automatic vendors, copying machines, agricultural and medical equipments.

Future Prospect

What about the Japanese machinery industry in the near future? With the reference to this question rather optimistic forecasts are prevailing, which are founding on the last steady progress and relative strength of the Japanese machinery industry. The Japanese machinery will remain in the favorable position it enjoys now, provided that no new machine will be launched in the international market in 1980s.

There appears a tendency for the world's machinery industry to go through the re-structuring, including the automotive industry. Through such a process, major companies of the Japanese machinery industry will play the leading role. ■

Table 9. Number of Female Workers in Electronics & Electrical Manufacturers

	1972	1973	1974	1975	1976
Hitachi	9,051 (10.8)	7,537 (9.3)	6,096 (8.6)	4,681 (6.3)	4,233 (5.8)
TOSHIBA	12,655 (18.0)	11,991 (17.0)	11,071 (15.5)	8,481 (12.5)	7,296 (11.0)
Matsushita	9,825 (21.7)	9,090 (19.6)	8,120 (17.3)	6,637 (14.8)	5,300 (14.5)
SONY	4,498 (43.5)	4,376 (39.9)	3,594 (34.9)	3,004 (31.0)	2,778 (29.3)
NEC	4,724 (13.8)	3,949 (11.9)	3,164 (9.6)	2,278 (6.9)	1,916 (6.0)
FUJITSU	5,940 (21.9)	6,446 (21.6)	6,372 (20.4)	5,630 (18.0)	5,160 (16.0)
TDK	1,143 (24.9)	1,012 (22.0)	967 (19.4)	415 (9.7)	328 (7.8)
Total	47,836 (17.4)	44,401 (16.1)	39,384 (14.4)	31,126 (11.8)	27,677 (10.7)

Remarks 1. Figures in parentheses are the percentage of women workers against total employees.

2. The numbers for Toshiba, Matsushita, Fujitsu include a part of clerical women workers. The numbers of 1976 for Matsushita and Fujitsu are estimates.

Source: Japan Economic Journal, Nov. 25, 1976

CSO: 4120/74

END